

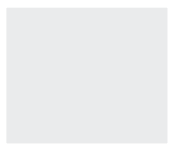


Installation Manual



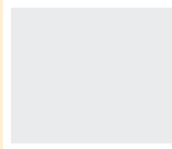
RES-32XR3/FIO Front I/O Chassis

3RU 19" Rack-Mount Rugged Enterprise Server
with X8DAH+-F Motherboard Configuration
/ Two Quad-Core 5500 or Quad/Six-Core 5600 Xeon CPUs



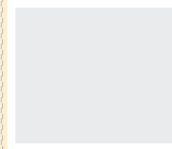
RES-32XR3/FIO - Front I/O

Two Quad-Core 5500 or Quad/Six-Core 5600 Xeon CPUs



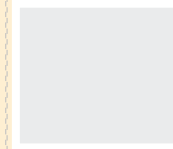
RES-32XR3/FIO - Front I/O

Two Quad-Core 5500 or Quad/Six-Core 5600 Xeon CPUs



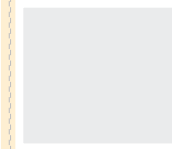
RES-32XR3/FIO - Front I/O

Two Quad-Core 5500 or Quad/Six-Core 5600 Xeon CPUs



RES-32XR3/FIO - Front I/O

Two Quad-Core 5500 or Quad/Six-Core 5600 Xeon CPUs



RES-32XR3/FIO - Front I/O

Two Quad-Core 5500 or Quad/Six-Core 5600 Xeon CPUs



RES-32XR3/FIO - Front I/O

Two Quad-Core 5500 or Quad/Six-Core 5600 Xeon CPUs



RES-32XR3/FIO - Front I/O

Two Quad-Core 5500 or Quad/Six-Core 5600 Xeon CPUs



RES-32XR3/FIO - Front I/O

Two Quad-Core 5500 or Quad/Six-Core 5600 Xeon CPUs



*RES-32XR3/FIO Installation Manual**

Version 1.0—July 2010

* SuperMicro Motherboard X8DAH+-F



Themis Computer—Americas and Pacific Rim
47200 Bayside Parkway
Fremont, CA 94538
Phone (510) 252-0870
Fax (510) 490-5529
World Wide Web <http://www.themis.com>

Themis Computer—Rest of World
5 Rue Irene Joliot-Curie
38320 Eybens, France
Phone +33 476 14 77 80
Fax +33 476 14 77 89

Copyright © 2010 Themis Computer, Inc.

ALL RIGHTS RESERVED. No part of this publication may be reproduced in any form, by photocopy, microfilm, retrieval system, or by any other means now known or hereafter invented without the prior written permission of Themis Computer.

The information in this publication has been carefully checked and is believed to be accurate. However, Themis Computer assumes no responsibility for inaccuracies. Themis Computer retains the right to make changes to this publication at any time without prior notice. Themis Computer does not assume any liability arising from the application or use of this publication or the product(s) described herein.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the United States Government is subject to the restrictions set forth in DFARS 252.227-7013 (c)(1)(ii) and FAR 52.227-19.

TRADEMARKS and SERVICEMARKS

Themis[®] is a registered trademark of Themis Computer, Inc.

Intel[®] is a registered trademark of Intel Corporation.

Xeon[™] is a trademark of Intel Corporation.

Red Hat[®] is a registered trademark of Red Hat, Inc.

Linux[®] is a registered trademark of Linus Torvalds.

All other trademarks, servicemarks, or registered trademarks used in this publication are the property of their respective owners.

CE Marking



This product complies with the European EMC Directive (2004/108/EC) and the European Low Voltage Safety Directive (2006/95/EC)/.

Safety Precautions

Instructions regarding safety precautions during installation, operation, or maintenance of the equipment are given in the section entitled “Safety Instructions” on page iv.

WARNINGS and CAUTIONS

The definitions of WARNINGS and CAUTIONS as used in this document are given in the Preface in the section entitled “Notes, Cautions, Warnings, and Sidebars”.

Themis Customer Support

North America, South America, and Pacific Rim

Telephone: 510-252-0870

Fax: 510-490-5529

E-mail: support@themis.com

Web Site: <http://www.themis.com>

Version Revision History

Version 1.0..... July 2010

Safety Instructions

To maximize user safety and ensure correct device operation, all instructions contained in this section should be read carefully.



Caution: It is important that the user observe all warnings and instructions that are on the device and contained in this manual.

- The device must be used in accordance with the instructions for use.
- Electrical installations in the room must correspond to the requirements of respective regulations.
- Take care that there are no cables, particularly mains cables, in areas where persons can trip over them.
- Do not use a mains connection in sockets shared by a number of other power consumers. Do not use an extension cable.
- Only use the mains cable supplied.
- The unit is completely disconnected from the power source only when the power cord is disconnected from the power source. Therefore the power cord and its connectors must always remain easily accessible.
- Do not set up the device in the proximity of heat sources or in a damp location. Make sure the device has adequate ventilation.
- All connection cables must be screwed or locked to the chassis housing.
- The device is designed to be used in horizontal position only.
- The device is no longer safe to operate when
 - the device has visible damage or
 - the device no longer functions.
- In these cases, the device must be shut down and secured against unintentional operation.
- Repairs may only be carried out by a person authorized by Themis Computer.
- The device may only be opened for the installation and removal of extension (PCI) cards, memory modules, storage drives, fan housings, power supplies,

and the lithium battery—all in accordance with the instructions given in this manual.

- If extensions are made to the device, the legal stipulations and the device specifications must be observed.
- The device must be switched off when removing the top cover; for example, before installing extension (PCI) cards.

Operation of Laser Source Devices

DVD/CD-ROM drives contain laser light-emitting diodes (classified in accordance with IEC 825-1:1993: LASER CLASS 1) and, therefore, must not be opened.

If the enclosure of such a drive is opened, invisible laser radiation is emitted. Do not allow yourself to be exposed to this radiation.

The laser system meets the code of Federal Regulations 21 CFR,1040 for the USA and Canadian Radiation Emitting Devices Act, REDR C 1370.

Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. Always take the following precautions:

1. Transport boards in static-safe containers such as boxes or bags.
2. Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
3. Always be properly grounded when touching a sensitive board, component, or assembly.
4. Store electrostatic-sensitive boards in protective packaging or on conductive foam.

Grounding Methods

Guard against electrostatic damage at workstations by following these steps:

1. Cover workstations with approved anti-static material. Provide a wrist strap connected to a work surface and properly grounded tools and equipment.

2. Use anti-static mats, heel straps, or air ionizers to give added protection.
3. Handle electrostatic-sensitive components, boards, and assemblies by the case or the PCB edge.
4. Avoid contact with pins, leads, or circuitry.
5. Turn off power and input signals before inserting and removing connectors or test equipment.
6. Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
7. Use field service tools, such as cutters, screwdrivers, and vacuums that are conductive.
8. Always place drives and boards PCB-assembly-side down on the foam.

Instructions for the Lithium Battery

Systems are equipped with a lithium battery installed on the motherboard. To replace this battery, please observe the instructions that are described in this manual.



Warning: There is a danger of explosion when the wrong type of battery is used as a replacement.

Table of Contents

. Preface	xix
1. Overview and Specifications	1-1
1.1 Overview	1-1
1.2 System LEDs and I/O Connectors	1-5
1.3 Chipset Overview	1-10
1.3.1 Features of the 5500/5600 Processor and the 5520 Chipset	1-10
1.4 Special Features	1-11
1.4.1 Recovery from AC Power Loss	1-11
1.5 PC Health Monitoring	1-11
1.5.1 Fan Status Monitor with Firmware Control	1-11
1.5.2 Environmental Temperature Control	1-11
1.5.3 CPU Fan Auto-Off in Sleep Mode	1-12
1.5.4 System Resource Alert	1-12
1.6 ACPI Features	1-12
1.6.1 Slow Blinking LED for Suspend-State Indicator	1-13
1.6.2 Main Switch Override Mechanism	1-13
1.7 Power Supply	1-13
1.8 Super I/O	1-14
1.9 Overview of the Winbond WPCM450 Controller	1-14
1.10 Specifications	1-15
1.10.1 General	1-15
1.10.2 Electrical	1-16
1.10.2.1 System Power	1-16
1.10.2.2 Output Voltage	1-17
1.10.3 Environmental	1-17
1.10.3.1 Shock	1-17
1.10.3.2 Electrostatic Discharge	1-17
1.11 Packaging and Shipping	1-18
1.11.1 Accessory Kit	1-18
1.11.2 Rack-Mount Slides (Optional)	1-19
2. Installation and Operation	2-1

2.1	Installation Procedures	2-1
2.1.1	Remove Protective Top Cover	2-1
2.1.2	Memory Modules	2-3
2.1.2.1	Installation	2-4
2.1.3	PCI Cards	2-7
2.1.3.1	Installing Cards	2-7
2.1.4	Lithium Battery	2-8
2.1.4.1	Removing the Lithium Battery	2-8
2.1.4.2	Installing a Lithium Battery	2-9
2.1.5	SATA Storage Drive	2-9
2.1.5.1	Storage Drive Removal	2-9
2.1.5.2	Storage Drive Installation	2-10
2.1.6	Removable 120-mm Fan	2-11
2.1.6.1	Removing and Installing a 120-mm Fan	2-11
2.1.7	Power Supply	2-12
2.1.7.1	Removing a Power Supply	2-12
2.1.7.2	Installing a Power Supply	2-13
2.2	Rack Mounts	2-14
2.2.1	Mounting Brackets	2-14
2.2.2	Rack-Mount Slides (Optional)	2-15
2.3	Operation	2-15
2.3.1	Plugging in the AC Power Cords	2-15
2.3.2	Getting Started	2-16
2.3.2.1	Configuration	2-16
2.3.2.2	Turning The System On	2-16
2.3.2.3	Linux Installation	2-16
2.3.3	Turning the System Off	2-17
3.	BIOS Setup Utility	3-1
3.1	Introduction	3-1
3.1.1	Starting BIOS Setup Utility	3-1
3.1.2	How To Change the Configuration Data	3-2
3.1.3	Starting the Setup Utility	3-2
3.2	Main Setup	3-3
3.2.1	System Time/System Date	3-3
3.2.2	Supermicro X8DAH	3-4
3.2.3	Processor	3-4

3.2.4	System Memory	3-4
3.3	Advanced Setup Configurations	3-5
3.3.1	Boot Features	3-5
3.3.1.1	Quick Boot	3-5
3.3.1.2	Quiet Boot	3-5
3.3.1.3	AddOn ROM Display Mode	3-6
3.3.1.4	Bootup Num-Lock	3-6
3.3.1.5	PS/2 Mouse Support	3-6
3.3.1.6	Wait For 'F1' If Error	3-6
3.3.1.7	Hit 'Del' Message Display	3-6
3.3.1.8	Watch Dog Function	3-6
3.3.1.9	Restore on AC Power Loss	3-6
3.3.1.10	Interrupt 19 Capture	3-6
3.3.2	Processor and Clock Options	3-7
3.3.2.1	CPU Ratio	3-7
3.3.2.2	Ratio CMOS Setting (Available when the item-CPU Ratio is set to Manual)	3-7
3.3.2.3	Clock Spread Spectrum	3-7
3.3.2.4	Hardware Prefetcher (Available when supported by the CPU) ..	3-7
3.3.2.5	Adjacent Cache Line Prefetch (Available when supported by the CPU)	3-7
3.3.2.6	Intel® Virtualization Technology (Available when supported by the CPU)	3-8
3.3.2.7	Execute-Disable Bit Capability (Available when supported by the OS and the CPU)	3-8
3.3.2.8	Simultaneous Multi-Threading (Available when supported by the CPU)	3-8
3.3.2.9	Active Processor Cores	3-8
3.3.2.10	Intel® EIST Technology	3-8
3.3.2.11	C1E Support	3-9
3.3.2.12	Intel® C-STATE Tech	3-9
3.3.2.13	C-State package limit setting (Available when Intel® C-State Tech is enabled)	3-9
3.3.2.14	C1 Auto Demotion	3-9
3.3.2.15	C3 Auto Demotion	3-9
3.3.3	DCA Technology	3-9
3.3.3.1	DCA Prefetch Delay	3-9
3.3.4	Advanced Chipset Control	3-10
3.3.4.1	QPI Links Speed	3-10

3.3.4.2	QPI Frequency	3-10
3.3.4.3	QPI L0s and L1	3-10
3.3.4.4	Memory Frequency	3-10
3.3.4.5	Memory Mode	3-10
3.3.4.6	Demand Scrubbing	3-11
3.3.4.7	Patrol Scrubbing	3-11
3.3.4.8	Throttling - Closed Loop / Throttling - Open Loop	3-11
3.3.4.9	HDA Controller	3-12
3.3.4.10	Intel VT-d	3-12
3.3.4.11	SR-IOV Support	3-12
3.3.4.12	NUMA Support	3-13
3.3.4.13	Intel I/OAT	3-13
3.3.4.14	Active State Power Management	3-13
3.3.4.15	Route Port 80h Cycles to	3-13
3.3.4.16	USB Functions	3-13
3.3.4.17	USB 2.0 Controller	3-13
3.3.4.18	Legacy USB Support	3-13
3.3.5	IDE/Floppy Configuration	3-13
3.3.5.1	Floppy A	3-14
3.3.5.2	SATA#1 Configuration	3-14
3.3.5.3	IDE Detect Timeout (sec)	3-14
3.3.5.4	Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Master, and Fourth IDE Master	3-14
3.3.6	PCI/PnP Configuration	3-17
3.3.6.1	Clear NVRAM	3-17
3.3.6.2	Plug & Play OS	3-17
3.3.6.3	PCI Latency Timer	3-17
3.3.6.4	PCI IDE BusMaster	3-17
3.3.6.5	PCI-E I/O Performance	3-17
3.3.6.6	PCI-E Slot 1 x8, PCI-E Slot 2 x16, PCI-E Slot 3 x8, PCI-E Slot 4 x8 (in x16 slot), PCI-E Slot 5 PCI-E x4 (in x8 slot), PCI-E Slot 6 x16, PCI-E Slot 7 x8.	3-18
3.3.6.7	Onboard LAN Option ROM Select	3-18
3.3.6.8	Load Onboard LAN1 Option ROM/Load Onboard LAN2 Option ROM	3-18
3.3.6.9	Boot Graphics Adapter Priority	3-18
3.3.7	Super IO Device Configuration	3-18
3.3.7.1	Serial Port1 Address/Serial Port2 Address	3-18
3.3.7.2	Onboard Floppy Controller	3-19

3.3.8	Remote Access Configuration	3-19
3.3.8.1	Remote Access	3-19
3.3.8.2	Serial Port Number	3-19
3.3.8.3	Serial Port Mode	3-19
3.3.8.4	Flow Control	3-19
3.3.8.5	Redirection After BIOS POST	3-19
3.3.8.6	Terminal Type	3-20
3.3.8.7	VT-UTF8 Combo Key Support	3-20
3.3.8.8	Sredir Memory Display Delay	3-20
3.3.9	Hardware Health Monitor	3-20
3.3.9.1	CPU Overheat Alarm	3-20
3.3.9.2	CPU 1 Temperature/CPU 2 Temperature/System Temperature	3-21
3.3.9.3	Voltage Readings	3-23
3.3.10	ACPI Configuration	3-23
3.3.10.1	High Performance Event Timer	3-23
3.3.10.2	USB Device Wakeup	3-23
3.3.10.3	PS2 KB/MS Wake Up	3-23
3.3.10.4	ACPI Aware O/S	3-24
3.3.10.5	Suspend Mode	3-24
3.3.10.6	ACPI APIC Support	3-24
3.3.10.7	APIC ACPI SCI IRQ	3-24
3.3.10.8	Headless Mode	3-24
3.3.10.9	ACPI Version Features	3-24
3.3.11	Trusted Computing	3-24
3.3.11.1	TCG/TPM (Trusted Platform Module) Support	3-24
3.3.12	IPMI Configuration	3-25
3.3.12.1	IPMI Firmware Revision	3-25
3.3.12.2	Status of BMC	3-26
3.3.13	View BMC System Event Log	3-26
3.3.13.1	Clear BMC System Event Log	3-26
3.3.14	Set LAN Configuration	3-26
3.3.14.1	Channel Number	3-27
3.3.14.2	Channel Number Status	3-27
3.3.15	IP Address Source	3-27
3.3.16	Mac Address	3-27
3.3.17	SET PEF Configuration	3-28
3.3.17.1	PEF Support	3-28
3.3.17.2	BMC Watch Dog Timer Action	3-28

3.3.18	Event Log Configuration	3-29
3.3.18.1	View Event Log	3-29
3.3.18.2	Mark all events as read	3-29
3.3.18.3	Clear event log	3-29
3.3.18.4	PCI Error Log	3-29
3.4	Security Settings	3-30
3.4.1	Supervisor Password	3-30
3.4.2	User Password	3-30
3.4.3	Change Supervisor Password	3-30
3.4.4	User Access Level (Available when Supervisor Password is set as above)	3-31
3.4.5	Change User Password (Available when a User Password is installed) ..	3-31
3.4.6	Clear User Password (Available only when User Password is installed)	3-31
3.4.7	Password Check (Available when a password is installed)	3-31
3.4.8	Boot Sector Virus Protection	3-31
3.5	Boot Configuration	3-32
3.5.1	Boot Device Priority	3-32
3.5.2	Storage Drives	3-32
3.5.3	Removable Drives	3-33
3.5.4	CD/DVD Drives	3-33
3.6	Exit Options	3-34
3.6.1	Save Changes and Exit	3-34
3.6.2	Discard Changes and Exit	3-34
3.6.3	Discard Changes	3-35
3.6.4	Load Optimal Defaults	3-35
3.6.5	Load Fail-Safe Defaults	3-35
3.7	BIOS Recovery	3-35
3.7.1	Boot Sector Recovery from a USB Device	3-36
3.7.2	Boot Sector Recovery from an IDE CD-ROM	3-36
3.7.3	Boot Sector Recovery from a Serial Port (“Serial Flash”)	3-36
3.7.3.1	Requirements	3-36
3.8	BIOS Error Beep Codes	3-40
Appendix A. Connector Pinouts		A-1
A.1	PS/2 Keyboard and Mouse	A-1
A.2	USB Ports	A-2

A.3	Serial Port	A-2
A.4	VGA Display Port	A-3
A.5	Gigabit Ethernet LAN Ports	A-4
A.6	IPMI Dedicated LAN Port	A-4
Appendix B. Rack-Mount Slide Installation		B-1
Appendix C. Red Hat Enterprise Linux 5 Installation		C-1
C.1	Introduction	C-1
C.2	Installation	C-2
C.2.1	Step 1.	C-2
C.2.2	Step 2.	C-2
C.2.3	Step 3	C-3
C.2.4	Step 4	C-3
C.2.5	Step 5	C-4
C.2.6	Step 6	C-4
C.2.7	Step 7	C-5
C.2.8	Step 8	C-6
C.2.9	Step 9	C-7
C.2.10	Step 10	C-8
C.2.11	Step 11	C-9
C.2.12	Step 12	C-10
C.2.13	Step 13	C-11
C.2.14	Step 14	C-12
C.2.15	Step 15	C-13
C.2.16	Step 16	C-14
C.2.17	Step 17	C-15
C.2.18	Step 18	C-16
C.2.19	Step 19	C-16
C.2.20	Step 20	C-17
C.2.21	Step 21	C-18
C.2.22	Step 22	C-18
Appendix D. Optional Remote On/Off Switch		D-1
D.1	Remote On/Off Configuration	D-1

D.2 Remote Only Configuration D-2

D.3 Ordering the Remote On/Off Switch D-2

Appendix E. Re-Packing InstructionsE-1

E.1 Re-Packaging for ShipmentE-1

E.2 Packing ComponentsE-1

E.3 Instructions for Re-PackingE-2

Index Index-1

Reader Comment Card

List of Figures

Figure 1	Rugged Enterprise Server Model RES-32XR3/FIO	xix
Figure 1-1	RES-32XR3/FIO.....	1-1
Figure 1-2	X8DAH+-F Motherboard Block Diagram.....	1-3
Figure 1-3	External Features of RES-32XR3/FIO (Front).....	1-4
Figure 1-4	Major Components of RES-32XR3/FIO (Open Top View).....	1-6
Figure 1-5	RES-32XR3/FIO System LEDs and I/O Connectors1	1-7
Figure 2-1	Remove the RES-32XR3/FIO Protective Access Cover	2-2
Figure 2-2	Remove the Air-Flow Deflector Screws.....	2-4
Figure 2-3	Memory Module Slot Locations	2-5
Figure 2-4	Memory Module Removal.....	2-6
Figure 2-5	PCI Card Installation	2-7
Figure 2-6	PCI Card Clamp.....	2-7
Figure 2-7	The RES-32XR3/FIO Lithium Battery and Socket	2-8
Figure 2-8	Unlocking the RES-32XR3/FIO Storage Drives (Front Doors Removed).....	2-9
Figure 2-9	RES-32XR3/FIO Storage Drive Removal.....	2-10
Figure 2-10	The RES-32XR3/FIO 120-mm Fans	2-11
Figure 2-11	The RES-32XR3/FIO Power Supply Locking Mechanism.....	2-13
Figure 2-12	Right Rack-Mount Bracket.....	2-14
Figure 2-13	AC Power Socket and LED on the RES-32XR3/FIO.....	2-15
Figure 2-14	System Power Button and LED on the RES-32XR3/FIO Front.....	2-16
Figure 3-1	Main BIOS Setup Screen	3-3
Figure 3-2	Advanced Settings	3-5
Figure 3-3	Security Settings	3-30
Figure 3-4	Boot Settings.....	3-32
Figure 3-5	Exit Options	3-34
Figure 3-6	AMI_FLSH HyperTerminal	3-38
Figure 3-7	ROM File Extraction	3-39

Figure 3-8	Flash Recovery	3-39
Figure A-1	USB Connector Pinout.....	A-2
Figure A-2	COM 1 Serial Connector Pinout.....	A-2
Figure A-3	RES-32XR3/FIO VGA Connector Pinout	A-3
Figure A-4	Ethernet Connector, Type RJ45	A-4
Figure B-1	Screw Locations for Rack-Mount Slides	B-1
Figure B-2	RES-32XR3/FIO Rack-Mount Slide Installation	B-3
Figure C-1	Power On after Linux DVD is Inserted into Drive	C-2
Figure C-2	Skip Key	C-2
Figure C-3	Welcome Screen	C-3
Figure C-4	Language Selection.....	C-3
Figure C-5	Selecting Layout Type	C-4
Figure C-6	Enter Installation Number.....	C-4
Figure C-7	Partitioning.....	C-5
Figure C-8	Reviewing Option	C-6
Figure C-9	Creating a Custom Layout	C-7
Figure C-10	Setting Up Boot Loader	C-8
Figure C-11	Master Boot Record (MBR)	C-9
Figure C-12	Network Devices List	C-10
Figure C-13	Edit Interface Pop-Up Screen	C-11
Figure C-14	Selecting Time Zone	C-12
Figure C-15	Setting Up Root Account and Password.....	C-13
Figure C-16	Package Installation Default Screen	C-14
Figure C-17	Optional Packages.....	C-15
Figure C-18	Option to Review or Continue	C-16
Figure C-19	Installation Begins	C-16
Figure C-20	Installation is Complete	C-17
Figure C-21	Login Screen	C-18

Figure C-22	Ready to use the Desktop.....	C-18
Figure D-1	Remote On/Off Switch Module	D-1
Figure E-1	Packaging Components.....	E-2
Figure E-2	Order of Assembly	E-3

List of Tables

Table 1	RES-x2XR3 Manual Matrix (AC and DC Power Supplies)	xx
Table 2	RES-x2XR3S / RES-x1XR3 17" Chassis Manual Matrix (AC and DC Power Supplies)	xxi
Table 3	RES-x2XR3/FIO 16" Chassis Manual Matrix (AC and DC Power Supplies)	xxii
Table 1-1	RES-32XR3/FIO Motherboard Options	1-2
Table 1-2	RES-32XR3/FIO Major Features	1-2
Table 1-3	Specifications of the RES-32XR3/FIO	1-5
Table 1-4	System LEDs	1-8
Table 1-5	I/O Connectors	1-9
Table 1-6	RES-32XR3/FIO General Specifications	1-15
Table 1-7	RES-32XR3/FIO Electrical Specifications.....	1-16
Table 1-8	Approximate Weights of the RES Series.....	1-19
Table 2-1	RES-32XR3/FIO Memory Capacity.....	2-3
Table 2-2	RES-32XR3/FIO Optimal Memory Population—Two CPUs Installed	2-3
Table A-1	PS/2 Keyboard/Mouse Pinout and Signal Descriptions	A-1
Table A-2	USB Connector Pinout Signal Descriptions	A-2
Table A-3	COM 1 Serial Connector Pinout Signal Descriptions	A-2
Table A-4	RES-32XR3/FIO VGA Connector-Pin Signals	A-3
Table A-5	RJ45 Ethernet Pinout Signals	A-4

Preface

This document, entitled *RES-32XR3/FIO Installation Manual*, provides instructions on how to install, configure, power up, boot, and perform diagnostics on the Themis Rugged Enterprise Server RES-32XR3/FIO (see photo), based on two 64-bit Intel 5520 Series Xeon™ Quad/Dual-Core CPUs with up to 6.4 GT/s each.

RES-32XR3/FIO supports the SuperMicro **X8DAH+-F** motherboard in a 16" chas-



Figure 1. Rugged Enterprise Server Model RES-32XR3/FIO

sis. (A matrix describing 16" chassis configurations is given in *Table 3*, page xxii; for a matrix describing 17" chassis configurations, see *Table 2*, page xxi; a matrix describing 20" chassis configurations is in *Table 1*, page xx.)

Table 1. RES-x2XR3 Manual Matrix (AC and DC Power Supplies)

Manual	Motherboard	RES-32XR3 Manual Part Number	RES-22XR3 Manual Part Number	RES-12XR3 Manual Part Number
Configuration 1	X8DTH-iF X8DTH-6F	116790-024	1176789-024	
Configuration 2	X8DTi X8DTi-F X8DTi-LN4F	117022-024	117017-024	
Configuration 3	X8DT3 X8DT3-F X8DT3-LN4F	117023-024	117018-024	
Configuration 4	X8DTN+	117024-024	117019-024	
Configuration 5	X8DAi X8DA3	117025-024	117020-024	
Configuration 6*	X8DAH+F	117026-024	117021-024	
Configuration 7	X8DTU-F		117280-024	116970-024

Naming Key: X8Dvwxyz

● System RES-x2XR3, where x = 3, 2, or 1

v: A = Sound chip; no graphics chip

T = Graphics chip; no sound chip

*Configuration 6 motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a "T" in the title.

w: H = Two Tylersburg Northbridge chips

blank = One Tylersburg Northbridge chip

U = Motherboard with cutout

x: i = SATA only

3 = SAS 1.0

6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI

blank = No IPMI

Table 2. RES-x2XR3S / RES-x1XR3 17" Chassis Manual Matrix (AC and DC Power Supplies)

Mother-board	CPU Sockets	RES-32XR3S Manual P/N	RES-22XR3S Manual P/N	RES-12XR3S Manual P/N	RES-31XR3 Manual P/N	RES-21XR3 Manual P/N	RES-11XR3 Manual P/N
X8DTL-6F X8DTL-6	2	117408-024	117412-024	117416-024			
X8DTL-3F X8DTL-3	2	117409-024	117413-024	117417-024			
X8DTL-iF X8DTL-i	2	117410-024	117414-024	117418-024			
X8DAL-3 X8DAL-i	2	117411-024	117415-024	117419-024			
X8SAX	1				117420-024	117421-024	
X8ST3-F X8STE	1				117385-024	117422-024	
X8STi X8STi-F X8STi-LN4 X8STi-3F	1						117423-024

Naming Key: X8uvwxyz
2, or 1

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: Not applicable

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

● System RES-x2XR3S and RES-x1XR3, where x = 3, 2, or 1

Table 3. RES-x2XR3/FIO 16" Chassis Manual Matrix (AC and DC Power Supplies)

Mother-board	CPU Sockets	RES-32XR3/FIO Manual P/N	RES-22XR3/FIO Manual P/N
X8DAH+-F*	2	117611-024	
X8DTU-F	2		117664-024

Naming Key: X8uvwxyz • System RES-x2XR3S and RES-x1XR3, where x = 3, 2, or 1

*RES-32XR3/FIO motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a "T" in the title.

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: *Not applicable*

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

The 3RU-high (5.25") RES-32XR3/FIO has been designed to fit into a standard 19" rack and is provided with rack-mount brackets with handles. *Optional* rack-mount slides are also available. The RES-32XR3/FIO is rugged enough to withstand extreme shock (up to 35G), temperature, and EMI as that associated with such demanding markets as the military, aerospace, and telecommunications industries.

The two quad-core/dual-core Intel Xeon CPUs operate up to 6.4 GT/s (with a 1333-MHz front-side system bus) and support up to 192 GigaBytes of DDR3 ECC FB-DIMM memory modules. The RES-32XR3/FIO is based on the functionality and capability of the following Intel chipset:

- Intel 5520 (Tylersburg) chipset
- ICH10R + 2x IOH-36D (Southbridge)

An overview of RES-32XR3/FIO design and specifications is given in Chapter 1, "Overview and Specifications", of this manual.

This manual is intended for an experienced system administrator with a knowledge of both networking and high-speed server systems.

Website Information

Themis Computer corporate and product information may be accessed on the World Wide Web by browsing the website <http://www.themis.com>.

Your Comments are Welcome

We are interested in improving our documentation and welcome your comments and suggestions. You can email your comments to us at docfeedback@themis.com. Please include the document part number in the subject line of your email.

Notes, Cautions, Warnings, and Sidebars

The following icons and formatted text are included in this document for the reasons described:



Note: A note provides additional information concerning the procedure or action being described.



Caution: A caution describes a procedure or action that may result in damage to the equipment. This may involve—but is not restricted to—heavy equipment or sharp objects. To reduce the risk, follow the instructions accompanying this symbol.



Warning: A warning describes a procedure or action that may cause injury or death to the operator. To reduce the risk, follow the instructions accompanying this symbol.



Sidebar: A “sidebar” adds detail to the section within which it is placed, but is not absolutely vital to the description or procedure of the section.

Overview and Specifications

1.1 Overview

The **RES-32XR3/FIO**, (see *Figure 1-1* below), is a rack-mounted system designed for above-average shock and vibration environments. The RES-32XR3/FIO supports single or dual Intel® 1366-pin LGA Xeon™ 64-bit processors (each up to 2.33 GHz with a 1333-MHz system bus), and has many computer- and graphics-intensive and diverse-I/O capabilities, ideal for a variety of military/aerospace and commercial telecommunications applications. Motherboard options supported by **RES-32XR3/FIO** are listed in *Table 1-1* on page 1-2.



Figure 1-1. RES-32XR3/FIO

(A block diagram is given in *Figure 1-2*, page 1-2).

Table 1-1. RES-32XR3/FIO Motherboard Options

Mother-board ^a	IPMI	SATA	SAS	Memory Slots	Graphics	Audio	PCI-e Slots	
							PCI-e x16	PCI-e x8
X8DAH+-F	Yes	Yes	—	18	Yes	Yes	3	4

a—SuperMicro Computer, Inc.

The RES-32XR3/FIO is designed within a 3RU-high (5.25”) form-factor 16” (40.6 cm) deep and 17.07” (43.4 cm) wide (which, with mounting brackets, fits a 19”-wide rack). Major features of the RES-32XR3/FIO motherboard are listed in *Table 1-2*.

Table 1-2. RES-32XR3/FIO Major Features

Processors	<ul style="list-style-type: none"> Two Quad Core Intel® 5600/5500 Series Xeon Processors
Chipset	<ul style="list-style-type: none"> Intel® 5520 (Tylersburg) chipset ICH10R + 2x IOH-36D
Memory	<ul style="list-style-type: none"> 18 DIMMs up to 192 GB 1333/1066/800 MHz DDR3 ECC Registered Memory
Expansion Slots	<ul style="list-style-type: none"> 3 (x16) PCI-E 2.0, 4 (x8) PCI-E 2.0
Disk Drive Options	<ul style="list-style-type: none"> 6 SATA slots: RAID 0, 1, 5, 10 support (Win), RAID 0,1,10 support (Linux)
Front I/O	<ul style="list-style-type: none"> PS/2 Keyboard/Mouse Ports 6 USB 2.0 front ports (USB 0 thru USB 5) plus 1 on motherboard, plus 2 internal headers (3ports) Total of 10 USB 2.0 compliant ports. 1 Serial port (COM 1) 2 RJ45 LAN ports (Gigabit Ethernet)—LAN 1 and LAN 2 VGA port Audio: 7.1 HD Audio, mike in, line in, side- and back-surround, CEN/LFE, front. IPMI 2.0 with virtual media over LAN and KVM-over-LAN support via dedicated RJ45 IPMI LAN port

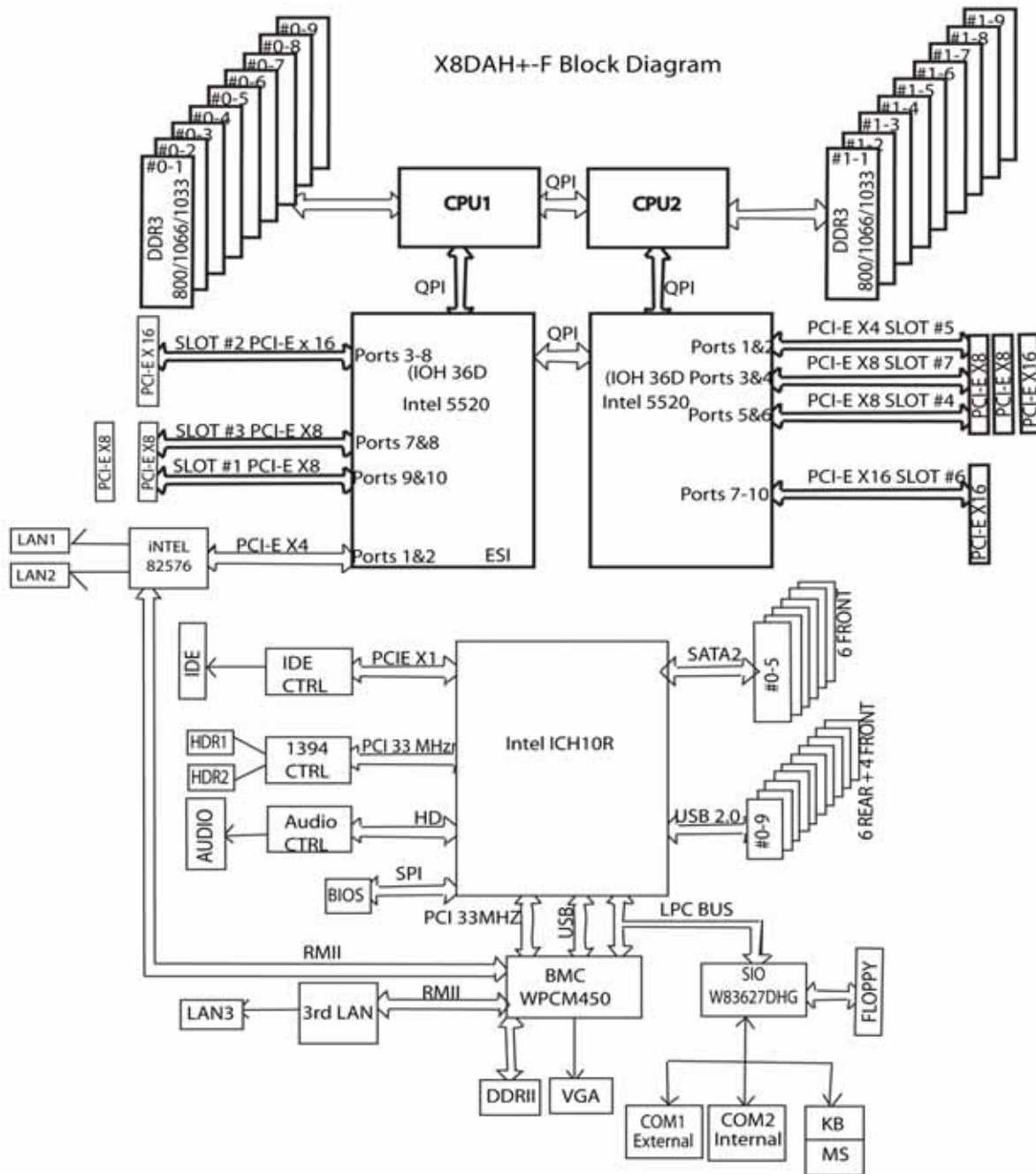


Figure 1-2. X8DAH+-F Motherboard Block Diagram

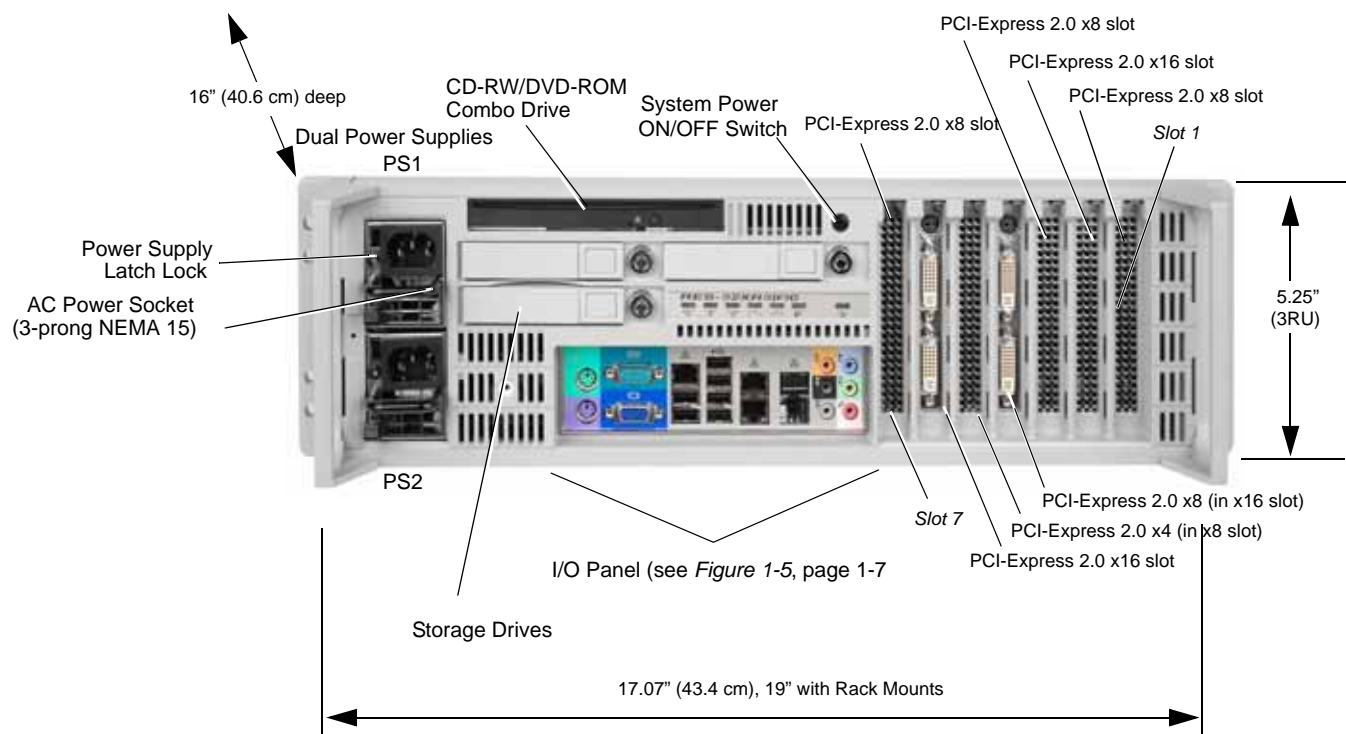


Figure 1-3. External Features of RES-32XR3/FIO (Front)

The RES-32XR3/FIO front panel houses three removable storage drive bays (see *Figure 1-3*). Six SATA drives are supported by the X8DAH+-F motherboard. Additional drives may be supported by an installed PCI-E card.

Drive requirements should be specified at the time the system is purchased.

Also included on the front panel is a reset switch and the system power button and LEDs (see *Figure 1-5* on page 1-7), I/O faceplates for seven PCI cards (graphics, RAID, NIC, etc.), two AC power supplies with latch locks and power-cord sockets, and all I/O connectors (see *Figure 1-5* on page 1-7).

Major features of the RES-32XR3/FIO are described in *Table 1-3*. Major internal components can be seen in the open top view (cover removed) of *Figure 1-4* on page 1-6.

Table 1-3. Specifications of the RES-32XR3/FIO

Feature	Details
Operating temperature ^a	<ul style="list-style-type: none">● 0° up to 65° C (32° up to 149°F)
Shock endurance ^a	<ul style="list-style-type: none">● 35G @ 25-msec duration (3 axis)
Dimensions	<ul style="list-style-type: none">● 5.25" (3RU) high, 17.07" (43.4 cm) wide (19"/48.3 cm with mounting brackets), 16" (40.6 cm) deep (including clearance for the rear thumb screws)
Rack-mount brackets and slides	<ul style="list-style-type: none">● Left and right rack-mount tabs are attached to the chassis● Left and right rack-mount slides are <i>optional</i>
Dual power supplies	<ul style="list-style-type: none">● 750 watts each, auto-ranging (100–240 VAC)● Load-sharing N+1 redundant, hot-pluggable● (<i>Optional</i>) 750 Watts DC power supply (48V and 28V)

^a—Specifications are dependent on the configurations specified in this manual.

1.2 System LEDs and I/O Connectors

All RES-32XR3/FIO system LEDs and all I/O connectors are located on the front panel (see **A**, *Figure 1-5*, page 1-7).

LEDs are described in *Table 1-4* on page 1-8; I/O connectors are described in *Table 1-5*, page 1-9.

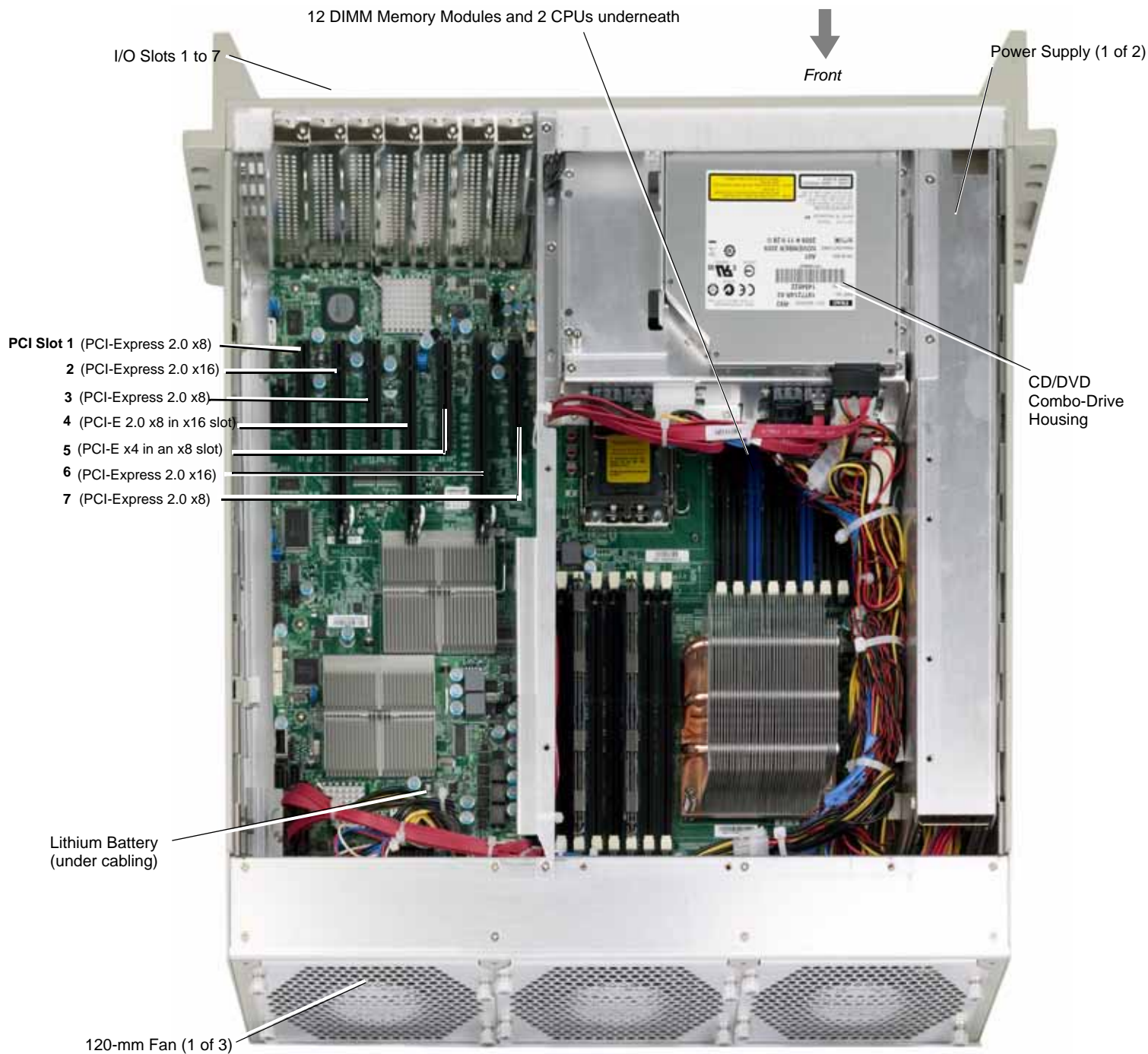


Figure 1-4. Major Components of RES-32XR3/FIO (Open Top View)

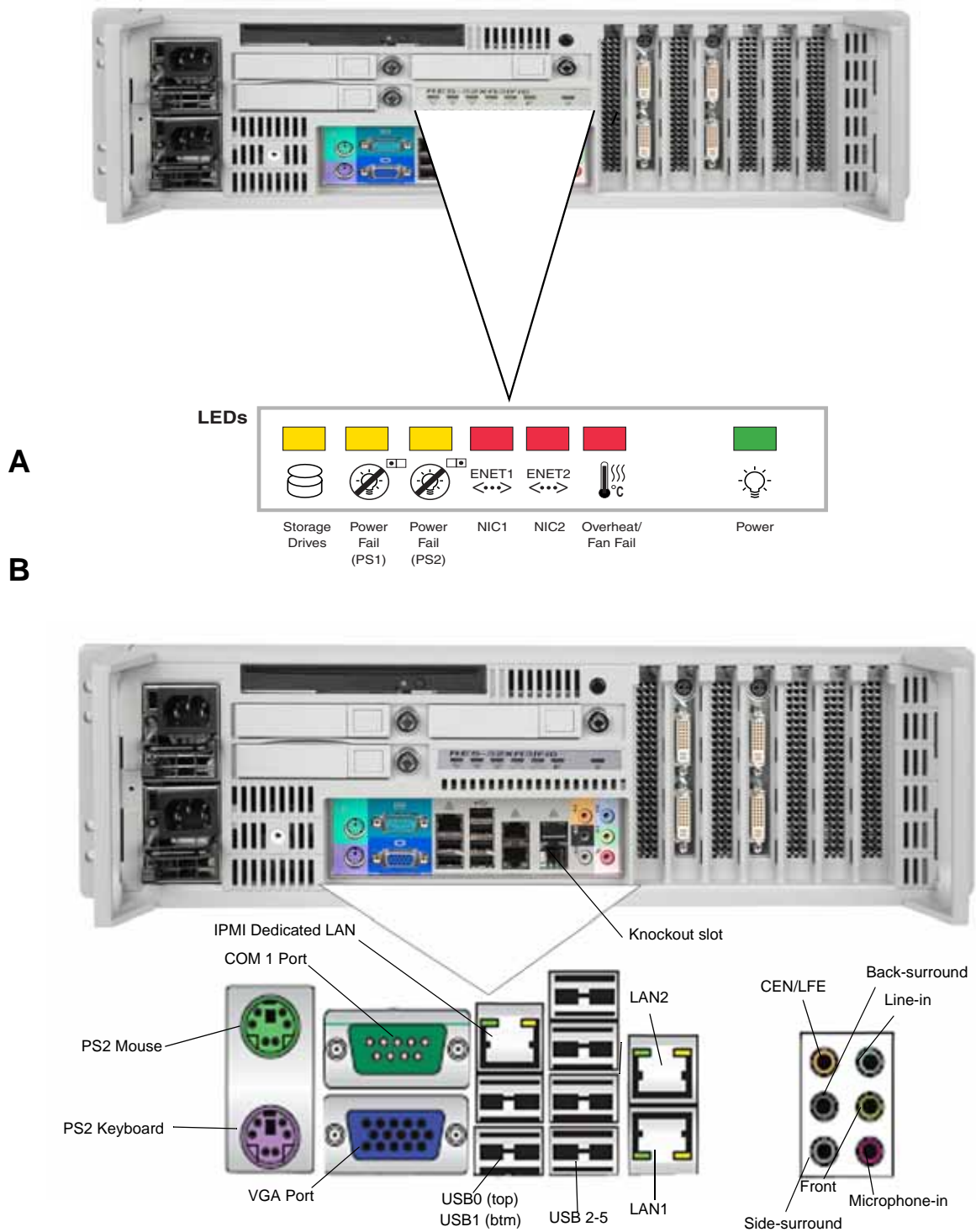









Figure 1-5. RES-32XR3/FIO System LEDs and I/O Connectors1

Table 1-4. System LEDs

Symbol	LED	Description
	Power	<ul style="list-style-type: none"> Indicates that the system is turned on.
	Storage Drive (SD)	<ul style="list-style-type: none"> Indicates SATA storage drive activity.
ENET1 	NIC1 ^a (Gb Ethernet)	<ul style="list-style-type: none"> Indicates network activity on LAN 1.
ENET2 	NIC2 (Gb Ethernet)	<ul style="list-style-type: none"> Indicates network activity on LAN 2.
	Power Fail (Lower Power Supply)	<ul style="list-style-type: none"> Warns that there is a failure in the lower power supply.
	Power Fail (Upper Power Supply)	<ul style="list-style-type: none"> Warns that there is a failure in the upper power supply.
	Overheat/Fan Fail —Normally OFF —RED light when temperature limits are exceeded	<ul style="list-style-type: none"> Warns that the system is exceeding specified temperature parameters. The CPU overheat warning function must be enabled in the BIOS, thus allowing the user to define an overheat temperature, which—when exceeded—triggers the overheat warning LED.
N/A	LAN1 and LAN2	<p>Each Ethernet port contains two LEDs:</p> <ul style="list-style-type: none"> The color of the left LED (when facing the port) indicates the LAN connection speed: <ul style="list-style-type: none"> Off = 10 MHz Green = 100 MHz Amber = 1 GHz The right LED, when lit, indicates LAN activity.

a—NIC = Network Interface Controller.

Table 1-5. I/O Connectors

Connector	Description
PS/2 Mouse	● 6-pin mini-DIN (female) connector to attach a PS/2 mouse device.
PS/2 Keyboard	● 6-pin mini-DIN (female) connector to attach a PS/2 keyboard device.
USB 0 thru USB 5 Hi-Speed USB 2.0 Serial Ports	● Six 4-pin USB connectors to attach serial devices to USB Port 0 thru USB Port 5. <i>Note:</i> Four additional USB ports can be accessed directly from the motherboard.
COM 1 Serial Port	● One DB9 (male) connector to attach a serial device to the COM 1 port
VGA Port	● 15-pin VGA connector to attach a monitor device.
Ethernet LAN Ports	● Standard RJ45 connectors to attach one or two gigabit Ethernet LAN line(s)—LAN 1 and LAN 2.
IPMI Dedicated LAN Port	● Standard RJ45 connector to attach a dedicated IPMI LAN line.

1.3 Chipset Overview

Built upon the functionality and capability of the Intel 5500/5600 series processor platform, the RES-32XR3/FIO motherboard provides the performance and feature sets required for dual-processor/IOH-based high-end systems optimized for High Performance Computing (HPC)/Cluster platforms. The 5520 chipset consists of the IOH 36D (I/O Hub), and the ICH10R (South Bridge). With the Intel QuickPath Interconnect (QPI) controller built in, the 5520 platform offers the next generation point-to-point system interconnect interface that replaces the current Front Side Bus Technology, substantially enhancing system performance and scalability.

The IOH-36D connects to each processor through an independent QPI link. Each link consists of 20 pairs of unidirectional differential lanes for transmission and receiving in addition to a differential forwarded clock. A full-width QPI link pair provides 84 signals.

The 5520 chipset supports up to 36 PCI Express Gen2 lanes, peer-to-peer read and write transactions. The ICH10R provides up to seven PCI-Express ports, six SATA ports and 10 USB connections. In addition, the 5520 platform also offers a wide range of RAS (Reliability, Availability and Serviceability) features. These features include memory interface ECC, x4/x8 Single Device Data Correction (SDDC), Cyclic Redundancy Check (CRC), parity protection, out-of-band register access via SMBus, memory mirroring, memory sparing, and Hot-plug support on the PCI-Express Interface.

1.3.1 Features of the 5500/5600 Processor and the 5520 Chipset

- Four processor cores in each processor with 8MB shared cache among cores
- Two full-width Intel QuickPath interconnect links, up to 6.4 GT/s of data transfer rate in each direction
- Virtualization Technology, Integrated Management Engine supported
- Point-to-point cache coherent interconnect, Fast/narrow unidirectional links, and Concurrent bi-directional traffic
- Error detection via CRC and Error correction via Link level retry

1.4 Special Features

1.4.1 Recovery from AC Power Loss

BIOS provides a setting for you to determine how the system will respond when AC power is lost and then restored to the system. You can choose for the system to remain powered off (in which case you must press the power switch to turn it back on) or for it to automatically return to a power-on state. See the Advanced BIOS Setup section to change this setting. The default setting is **Last State**.

1.5 PC Health Monitoring

This section describes the PC health monitoring features of the RES-32XR3/FIO motherboard. All have an onboard System Hardware Monitor chip that supports PC health monitoring. An onboard voltage monitor will scan these onboard voltages continuously:

CPU1 Vcore, CPU2 Vcore, CPU1 Vtt, CPU2 Vtt, CPU1 DIMM, CPU2 DIMM, 1.1V, 1.5V, 1.8V, 3.3V, 12V, 5V, 3.3 Vsb, and VBAT.

Once a voltage becomes unstable, a warning is given or an error message is sent to the screen. Users can adjust the voltage thresholds to define the sensitivity of the voltage monitor.

1.5.1 Fan Status Monitor with Firmware Control

The PC health monitor can check the RPM status of the cooling fans. The onboard CPU and chassis fans are controlled by Thermal Management in the BIOS (under Hardware Monitoring in the Advanced section).

1.5.2 Environmental Temperature Control

The thermal control sensor monitors the CPU temperature in real time and will turn on the thermal control fan whenever the CPU temperature exceeds a user-defined threshold. The overheat circuitry runs independently from the CPU. Once it detects that the CPU temperature is too high, it will automatically turn on the thermal fan control to prevent any overheat damage to the CPU. The onboard chassis thermal

circuitry can monitor the overall system temperature and alert users when the chassis temperature is too high.



Caution: To avoid possible system overheating, please be sure to provide adequate airflow to your system.

1.5.3 CPU Fan Auto-Off in Sleep Mode

The CPU fan becomes active when the power is turned on. It continues to operate when the system enters the Standby mode. When in the sleep mode, the CPU will not run at full power, thereby generating less heat.

1.5.4 System Resource Alert

This feature is available when used with Supero Doctor III in the Windows OS environment or used with the Supero Doctor II in Linux. Supero Doctor is used to notify the user of certain system events. For example, you can also configure Supero Doctor to provide you with warnings when the system temperature, CPU temperatures, voltages and fan speeds go beyond a pre-defined range.

1.6 ACPI Features

ACPI stands for Advanced Configuration and Power Interface. The ACPI specification defines a flexible and abstract hardware interface that provides a standard way to integrate power management features throughout a PC system, including its hardware, operating system and application software. This enables the system to automatically turn on and off peripherals such as CD-ROMs, network cards, storage drives and printers.

In addition to enabling operating system-directed power management, ACPI provides a generic system event mechanism for Plug and Play and an operating system-independent interface for configuration control. ACPI leverages the Plug and Play BIOS data structures while providing a processor architecture-independent implementation that is compatible with both Windows 2003 and Windows 2008 Operating Systems.

1.6.1 Slow Blinking LED for Suspend-State Indicator

When the CPU goes into a suspend state, the chassis power LED will start blinking to indicate that the CPU is in suspend mode. When the user presses any key, the CPU will wake-up and the LED will automatically stop blinking and remain on.

1.6.2 Main Switch Override Mechanism

When an ATX power supply is used, the power button can function as a system suspend button to make the system enter a SoftOff state. The monitor will be suspended and the storage drive will spin down. Pressing the power button again will cause the whole system to wake-up. During the SoftOff state, the ATX power supply provides power to keep the required circuitry in the system “alive.” In case the system malfunctions and you want to turn off the power, just press and hold the power button for 4 seconds. This option can be set in the Power section of the BIOS Setup routine.

1.7 Power Supply

As with all computer products, a stable power source is necessary for proper and reliable operation. It is even more important for processors that have high CPU clock rates.

The RES-32XR3/FIO motherboard can accommodate 24-pin ATX power supplies. Although most power supplies generally meet the specifications required by the CPU, some are inadequate. In addition, the 12V 8-pin power connections are also required to ensure adequate power supply to the system. Also your power supply must supply 1.5A for the Ethernet ports.



Caution: To prevent damage to your power supply or motherboard, please use a power supply that contains a 24-pin and two 8-pin power connectors. Be sure to connect these power connectors to the 24-pin and the two 8-pin power connectors on your motherboard for adequate power supply to your system. Failure to do so will void the manufacturer warranty on your power supply and motherboard.

It is strongly recommended that you use a high quality power supply that meets ATX power supply Specification 2.02 or above. It must also be SSI compliant (for more information, please refer to the web site at <http://www.ssiforum.org/>). Additionally, in areas where noisy power transmission is present, you may choose to install a line

filter to shield the computer from noise. It is recommended that you also install a power surge protector to help avoid problems caused by power surges.

1.8 Super I/O

The disk drive adapter functions of the Super I/O chip include a floppy disk drive controller that is compatible with industry standard 82077/765, a data separator, write pre-compensation circuitry, decode logic, data rate selection, a clock generator, drive interface control logic and interrupt and DMA logic. The wide range of functions integrated onto the Super I/O greatly reduces the number of components required for interfacing with floppy disk drives. The Super I/O supports 360 K, 720 K, 1.2 M, 1.44 M or 2.88 M disk drives and data transfer rates of 250 Kb/s, 500 Kb/s or 1 Mb/s. It also provides two high-speed, 16550 compatible serial communication ports (UARTs). Each UART includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem control capability and a processor interrupt system. Both UARTs provide legacy speed with baud rate of up to 115.2 Kbps as well as an advanced speed with baud rates of 250 K, 500 K, or 1 Mb/s, which support higher speed modems.

The Super I/O provides functions that comply with ACPI (Advanced Configuration and Power Interface), which includes support of legacy and ACPI power management through an SMI or SCI function pin. It also features auto power management to reduce power consumption. Specifications.

1.9 Overview of the Winbond WPCM450 Controller

The Winbond WPCM450 Controller is a Baseboard Management Controller (BMC) that supports the 2D/VGA-compatible Graphics Core with the PCI interface, Virtual Media, and Keyboard/Video/Mouse Redirection (KVMR) modules. With blade-oriented Super I/O capability built-in, the WPCM450 Controller is ideal for legacy-reduced server platforms.

The WPCM450 interfaces with the host system via a PCI interface to communicate with the Graphics core. It supports USB 2.0 and 1.1 for remote keyboard/mouse/virtual media emulation. It also provides LPC interface to control Super IO functions. The WPCM450 is connected to the network via an external Ethernet PHY module.

The WPCM450 communicates with onboard components via six SMBus interfaces, fan control, and Platform Environment Control Interface (PECI) buses.

1.10 Specifications

1.10.1 General

Table 1-6 lists general specifications for the RES-32XR3/FIO.

Table 1-6. RES-32XR3/FIO General Specifications

Parameter	Description
Dimensions	<ul style="list-style-type: none"> • 5.25" (3RU) high • 17.07" (43.4 cm) wide (19" rack-mountable) • 16" (40.6 cm) deep (including clearance for the rear thumb screws)
Weight	<ul style="list-style-type: none"> • Under 27 pounds (12.3 kg), includes 2 full-length (up to 12.25") PCI cards, 1 CD-RW/DVD-ROM drive, 2 SATA storage drives, and 2 power supplies • Add 8.8 pounds (4 kg) for the shipping container and two AC power cords • The manual and associated shipping paperwork weighs approximately 1 lb (0.5 kg)
19" Rack-Mountable with Slide capability	<ul style="list-style-type: none"> • Left and right rack-mount tabs attached to chassis • Left and right rack-mount slides are <i>optional</i>
Temperature ^a Operating: Non-Operating:	<ul style="list-style-type: none"> • 0° up to 65° C (32° up to 149°F) • -40° to 70° C (-40° to 158° F)
Relative Humidity ^a Operating: Non-Operating:	<ul style="list-style-type: none"> • 8% to 95% (non-condensing) • 5 to 95% (non-condensing)
Maximum Wet Bulb ^a Operating: Non-Operating:	<ul style="list-style-type: none"> • 55°C, non-condensing • 70°C, non-condensing
Altitude ^a Operating: Non-Operating	<ul style="list-style-type: none"> • 0 to 10,000 feet above sea level • 0 to 40,000 feet above sea level

^a—Specifications are dependent upon the configuration in this manual.

1.10.2 Electrical

Table 1-7 lists the electrical specifications for the RES-32XR3/FIO.

Table 1-7. RES-32XR3/FIO Electrical Specifications

Parameter	Description		
	AC (120 volts, 750W)	DC (48 volts, 750W)	DC (28 volts, 500W)
Input Power (<i>typical</i>)	• 420 watts (<i>typical</i>) ^a	• 420 watts (<i>typical</i>) ^a	• 450 watts (<i>typical</i>) ^a
Input Current	• 3.5 amperes @120 Vac	• 13.5 amperes @48 Vdc	• 16 amperes @28 Vdc
Input Frequency	• 47–63 Hertz	NA ^b	NA ^b
Input Voltage	• 100–265 Vac, internally fused	• 40–72 Vdc, internally fused	• 18–36 Vdc, internally fused
Input VA Rating	• 425 VA	NA	NA
BTU Rating	• 1447 BTU/hour	• 1447 BTU/hour	• 1447 BTU/hour
Power Factor	• 0.99	NA	NA
Input Leakage Current	• 3.5 mA	NA	NA
Plug Type	• IEC	• Y-Type (SVS5-4 or equivalent)	• Y-Type (SVS5-4 or equivalent)

a—Does not include plug-in PCI cards.

b—NA = Not Applicable.

1.10.2.1 System Power

The RES-32XR3/FIO operates with two N+1 redundant AC power supplies of 750-watts capacity each that auto-range single-phase AC input from 100 to 240 VAC (47 to 63 Hertz) sources. Filtered and fused (internal) AC is supplied to each power supply from a front-mounted power connection.

Two *optional* N+1 redundant DC power supplies of 750-watts each may be substituted for the AC power supplies. This should be specified at the time of your order.

1.10.2.2 Output Voltage

The RES-32XR3/FIO power supply provides output voltages that are split between +3.3V, +5V, +5V_{sb}, +12V, and -12V rails.

1.10.3 Environmental

1.10.3.1 Shock

The RES-32XR3/FIO is designed to survive an elevated shock environment. All structural components are welded together, enabling the system to survive a maximum 3-axis shock load of 35G at 25-ms duration.

1.10.3.2 Electrostatic Discharge

The RES-32XR3/FIO is designed to tolerate electrostatic pulses up to 15 kilovolts (KV) with no impact on system operation.

1.11 Packaging and Shipping

The RES-32XR3/FIO is packaged in a reusable shipping container. Approximate weight of an empty container and two AC power cords is 8.8 pounds (4 kg).

The approximate weight of a RES-32XR3/FIO (loaded with 2 storage drives, two PCI cards, a CD-RW/DVD-ROM drive, and two power supplies) is under 27 pounds (12.3 kg).

The approximate weight of a manual and associated shipping paperwork is one pound (0.5 kg).

Therefore, both the shipping container and a fully installed RES-32XR3/FIO including power cords, manual, and associated paperwork, weigh under 37 pounds (16.5 kg).



Caution: Do not discard the original packaging in which your system was shipped.

The original packaging was designed specifically to withstand the stress and rigors of today's shipping environment. It will be needed in the event the system must be shipped back to Themis Computer. For re-packing instructions, see "Re-Packing Instructions" on page E-1

1.11.1 Accessory Kit

Each RES-32XR3/FIO is packaged with an Accessory Kit, consisting of the following items:

- A. A Power-cord Retainer Bracket
- B. Two AC Power Cords
- C. Two Storage Drive Barrel Keys

When you unpack the RES-32XR3/FIO, please verify that all of these items are included. If any of these items are missing or not as pictured, please call Themis Technical Support at 510-252-0870, or send an email to support@themis.com.

To learn how to secure the AC power cords and the power-cord retainer bracket, refer to Section 2.3.1, "Plugging in the AC Power Cords," on page 2-15.

1.11.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-32XR3/FIO for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and can be ordered at the time of purchase.

To learn how to install rack-mount slides, refer to Appendix B, “Rack-Mount Slide Installation”.

Table 1-8. Approximate Weights of the RES Series

Model	Weight (Approximate)	CPU Sockets	Depth	Description
RES-12XR3	19.5 lbs (8.9 kg)	2	20"	Includes: <ul style="list-style-type: none"> • All CPU sockets filled • 6 DIMMs • 2 storage drives • 2 PCI cards • 1 CD-RW/DVD-ROM drive • 2 power supplies
RES-12XR3-S	17 lbs (7.7 kg)	2	17"	
RES-11XR3	16.5 lbs (7.5 kg)	1	17"	
RES-22XR3	25 lbs (11.4 kg)	2	20"	Includes: <ul style="list-style-type: none"> • All CPU sockets filled • 6 DIMMs • 2 storage drives • 2 PCI cards • 1 CD-RW/DVD-ROM drive • 2 power supplies
RES-22XR3-S	23 lbs (10.4kg)	2	17"	
RES-22XR3/FIO	25.3 lbs (11.5kg)	2	16"	
RES-21XR3	22.5 lbs (10.2 kg)	1	17"	
RES-32XR3	28.5 lbs (12.9 kg)	2	20"	Includes: <ul style="list-style-type: none"> • All CPU sockets filled • 6 DIMMs • 2 storage drives • 2 PCI cards • 1 CD-RW/DVD-ROM drive • 2 power supplies
RES-32XR3-S	26.5 lbs (12 kg)	2	17"	
RES-32XR3/FIO	29 lbs (13.2 kg)	2	16"	
RES-31XR3	26 lbs (11.8 kg)	1	17"	

Installation and Operation

This chapter describes:

- How to install a memory module, storage drive, PCI card, 120-mm-fan, power supply, and lithium battery.
- Rack-mount brackets and slides
- How to turn the RES-32XR3/FIO on and off

2.1 Installation Procedures



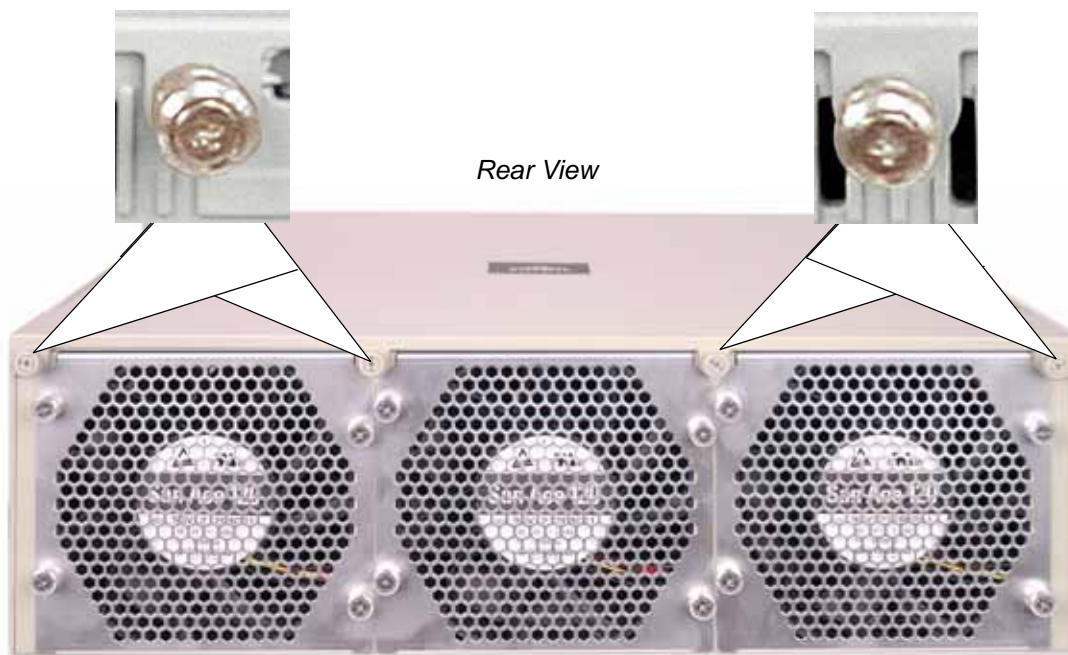
Caution: Use industry-standard ESD grounding techniques when handling all components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface. **Handle all IC cards by the front panel or edges only.**

To install or replace a **storage drive, fan, or power supply**, skip the next section and proceed directly to page 2-9, page 2-11, or page 2-12, respectively. Replacement of motherboard components requires removal of the protective cover.

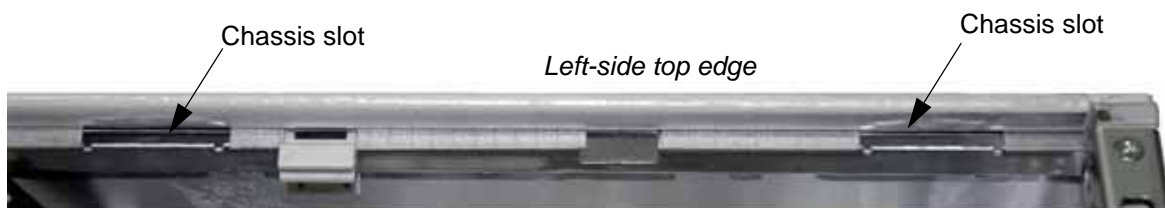
2.1.1 Remove Protective Top Cover

To access a motherboard component, open the RES-32XR3/FIO as follows:

1. Loosen the four captive Phillips screws holding the protective top access cover to the rear of the RES-32XR3/FIO chassis (see **A**, *Figure 2-1*).
2. Both the front and sides of the cover have flat hooks or tabs underneath that fit under slots on the chassis top edges (see **B**, *Figure 2-1*). Remove the cover by sliding it toward the rear until it is free of these chassis slots.
3. Store the cover in a safe place until it is replaced.



A Loosen the 4 captive access-cover screws...



B ... and slide the top cover toward the rear until the top hooks and tabs clear all chassis slots

Figure 2-1. Remove the RES-32XR3/FIO Protective Access Cover

4. Proceed to the appropriate section to install or replace a **memory module** (page 2-3), **PCI card** (page 2-7), or **lithium battery** (page 2-8).

2.1.2 Memory Modules

The RES-32XR3/FIO supports memory according to *Table 2-1*.

Table 2-1. RES-32XR3/FIO Memory Capacity

Motherboard	Memory Parameters				
	Capacity	DDR3 Registered ECC	Speed (MHz)	Number of DIMMS	Pins per DIMM
X8DAH+-F	144 GB	Yes	1333/1066/800	18	240



Caution: Exercise extreme caution when installing or removing FBD Memory Modules to prevent any possible damage.

Table 2-2. RES-32XR3/FIO Optimal Memory Population—Two CPUs Installed

DIMMs	CPU 1 (To populate P1-DIMMs)									CPU 2 (to populate P2-DIMMs)								
	Branch 0			Branch 1			Branch 2			Branch 0			Branch 1			Branch 2		
6 DIMMs	1A			1B			1C			1A			1B			1C		
12 DIMMs	1A	2A		1B	2B		1C	2C		1A	2A		1B	2B		1C	2C	
18 DIMMs	1A	2A	3A	1B	2B	3B	1C	2C	3C	1A	2A	3A	1B	2B	3B	1C	2C	3C

When installing memory, follow these rules for best memory performance:

- It is strongly recommended that you *do not mix memory modules* of different speeds and sizes. If DIMMs of different speeds have been installed, verify that the BIOS setup is configured for the fastest speed of RAM used.

2.1.2.1 Installation

The following procedure explains how to install the DDR3 Memory Modules.

1. Loosen and remove the screws securing the air-flow deflector and PCI card retainer bracket in the following manner: (see *Figure 2-2*).
 - **Screw A**—Unscrew the captive screw marked “A” from it’s socket, remove the PCI card retainer bracket and store it in a safe place.

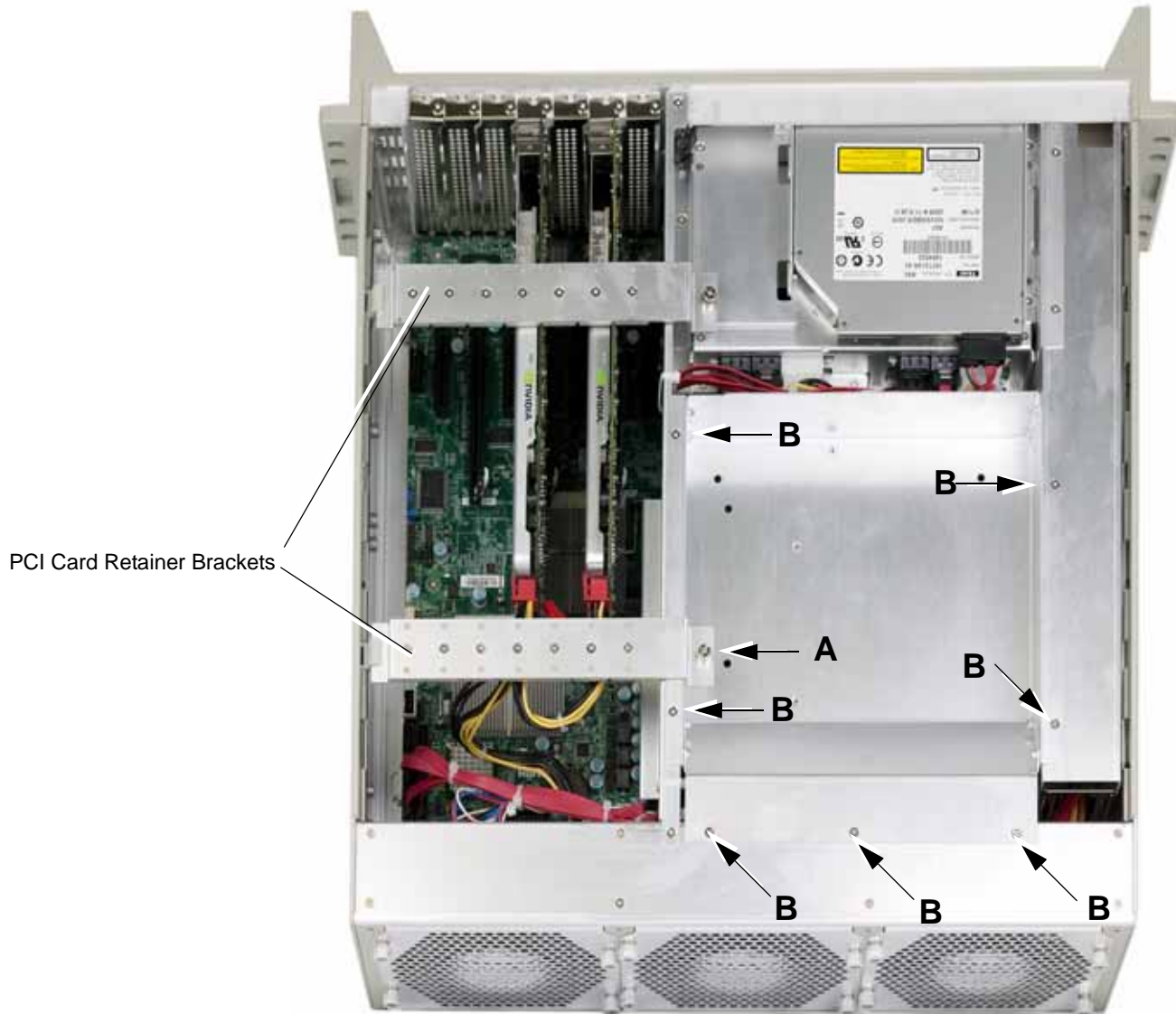


Figure 2-2. Remove the Air-Flow Deflector Screws

- **Screw B**—Remove the eight screws marked “B” in *Figure 2-2* on page 2-4, which will free the air-flow diverter so that it can be removed from the system. After the air-flow diverter has been removed, the memory module slots will be exposed (see *Figure 2-3*).

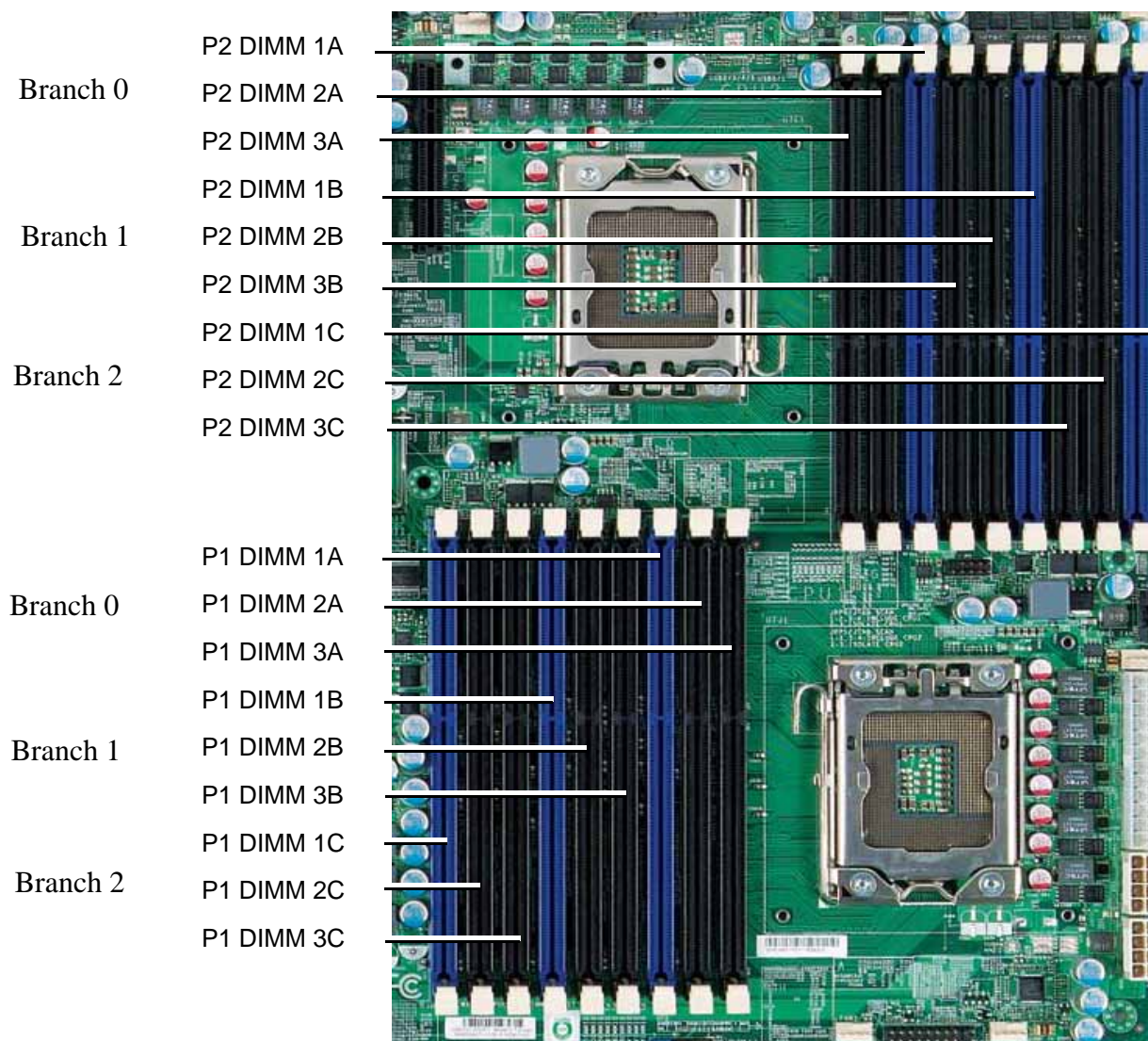


Figure 2-3. Memory Module Slot Locations

2. If a module is already seated in the slot you have selected for installation, remove it by gently pressing down and outward on the latches at both ends of the slot (see *Figure 2-4* on page 2-6), then pulling the old module directly up from the slot until it is free of the connector (see *Figure 2-4* on page 2-6).

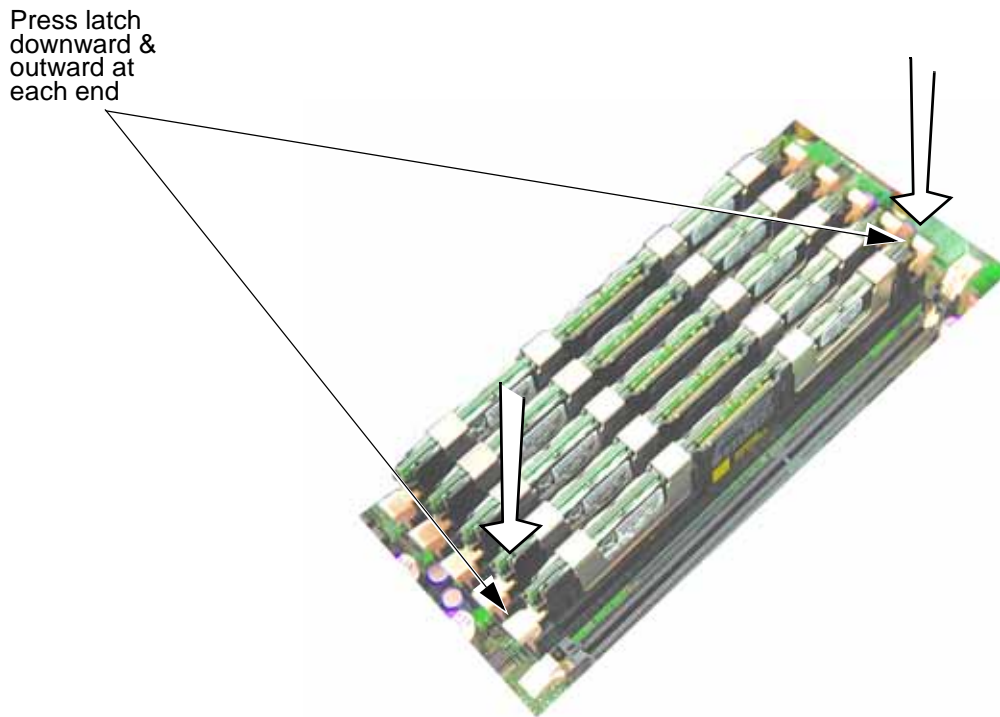


Figure 2-4. Memory Module Removal

3. Before inserting a new memory module into the vacant slot, make sure that the two latches are pulled outward away from the center of the slot.

With the latches in the outward position, gently insert the new module vertically into its slot and press firmly downward until it snaps into place.



Note: Make sure the memory module has the proper orientation by aligning the alignment notch at the bottom edge with its counterpart ridge at the bottom of the slot.

4. When finished replacing memory modules, replace the air flow diverter and secure it with the seven screws previously removed.
5. Replace the PCI card retainer bracket and secure it with the single captive screw loosened in Step 1 on page 2-4.

2.1.3 PCI Cards

The RES-32XR3/FIO supports seven PCI-Express slots. (see *Figure 2-5*).

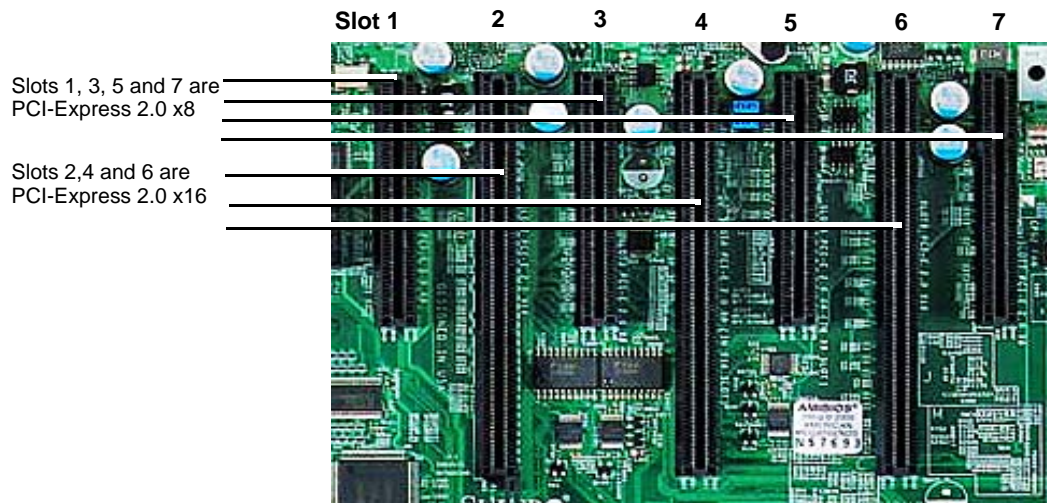


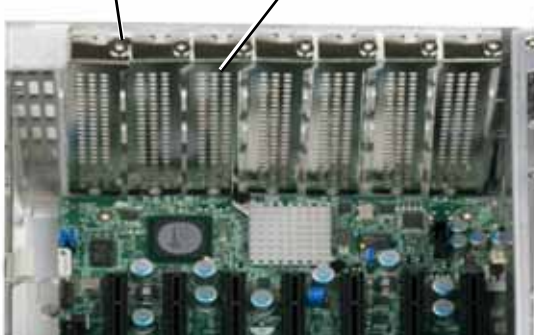
Figure 2-5. PCI Card Installation

2.1.3.1 Installing Cards

Perform the following steps to install a PCI card:

1. Locate the empty slot within which a card will be installed (see *Figure 2-5*).

Captive knurled screw PCI card I/O panels (7 total)



Loosen the captive knurled screw...

... and lift the PCI slot covers clear.

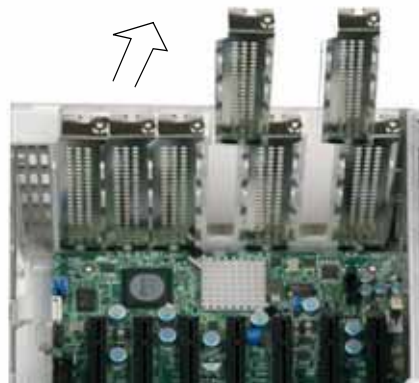


Figure 2-6. PCI Card Clamp

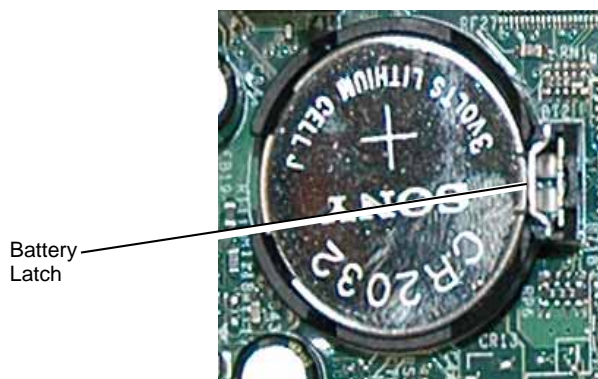
2. Loosen the captive knurled screw on the chosen PCI slot covers and remove the slot covers. (see *Figure 2-6*).
3. Install the new card, making sure the I/O panel is aligned with the chassis opening.
4. Repeat Step 1 and Step 3 until all additional cards have been installed.
5. Attach any internal I/O cables to the installed PCI cards, and carefully fold and tuck any exposed ribbon cables into the cabinet.
6. If you have no further installations to perform, close the RES-32XR3/FIO chassis by refastening the top cover removed in Section 2.1.1, “Remove Protective Top Cover,” on page 2-1.

2.1.4 Lithium Battery

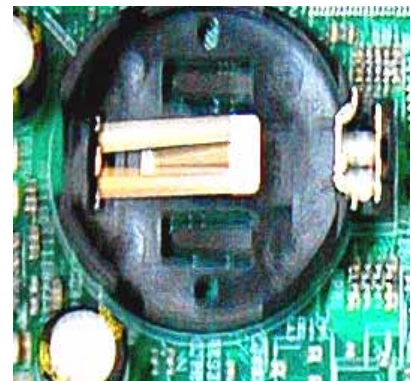
2.1.4.1 Removing the Lithium Battery

Perform the following steps to remove the lithium battery:

1. Make sure the system is powered off (see “Operation” on page 2-15).
2. Locate the lithium battery socket and squeeze the latch (see **A**, *Figure 2-7*) together until the battery lifts out of its socket.



A To release, squeeze battery latch together...



B ... and remove battery from socket

Figure 2-7. The RES-32XR3/FIO Lithium Battery and Socket

3. Remove the old battery and replace with a new battery (see next section).

2.1.4.2 Installing a Lithium Battery

Perform the following steps to insert a new lithium battery:

1. Tilt the replacement battery into the empty socket so that it is angled under the battery latch (see **B**, *Figure 2-7*).
2. Carefully press down on the battery until it clicks firmly into place.

2.1.5 SATA Storage Drive

The accessory kit shipped with your RES-32XR3/FIO contains two barrel lock keys. This provides you the option of unlocking/locking the storage drives (see *Figure 2-8*).

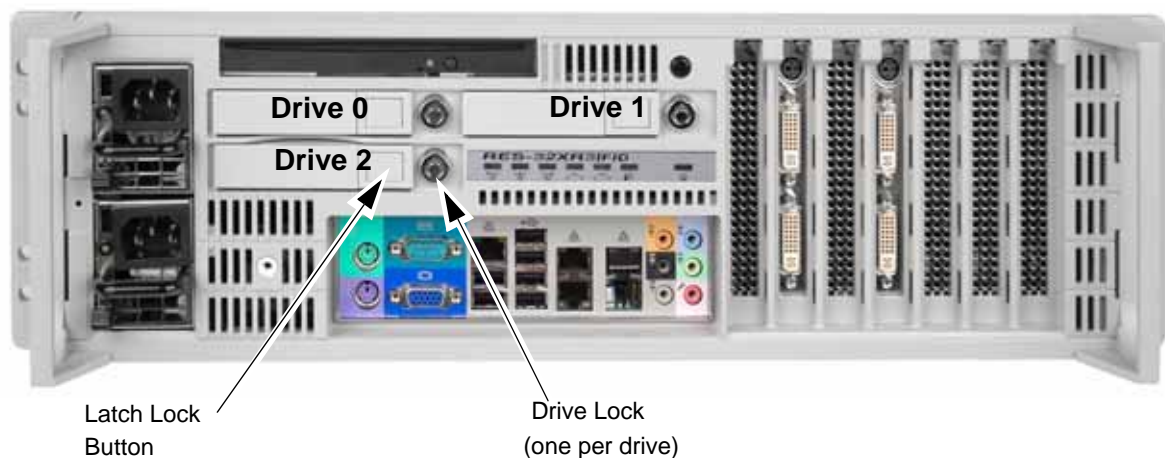


Figure 2-8. Unlocking the RES-32XR3/FIO Storage Drives (Front Doors Removed)

2.1.5.1 Storage Drive Removal

Perform the following steps to remove and install a storage drive: (see *Figure 2-8*).

1. Make sure the system is powered off (see “Operation” on page 2-15).
2. Locate the drive to be removed.
3. Insert the barrel lock key into the storage drive you want to remove, and turn it 45 degrees clockwise (presuming the storage drive is locked; see **A** in *Figure 2-9* on page 2-10).

4. Firmly push in the latch lock until the latch handle releases away from the drive (see **B** in *Figure 2-9*).
5. Grab the latch handle and pull the drive completely away from its slot (see **C** in *Figure 2-9*).



Caution: When pulling the storage drive from the chassis, hold it at the bottom to prevent it from falling and damaging the drive.

- A** Insert key into barrel lock and turn 45 degrees clockwise,...



- B** ... push the latch lock,...



- C** ... and pull drive out with the latch handle



Figure 2-9. RES-32XR3/FIO Storage Drive Removal

2.1.5.2 Storage Drive Installation

To install a storage drive,

1. Make sure the latch handle of the drive to be installed is in the open position.
2. Properly orient the new drive and insert it into the vacant drive slot. If the drive cannot be inserted into the slot, rotate it 180 degrees.
3. Push the drive toward the rear (DO NOT CLOSE the latch handle while pushing) until the drive is flush with the front of the chassis. The handle will swing closed when it comes into contact with the RES-32XR3/FIO chassis.

4. When the drive is fully inserted in its slot, insert the key into the barrel lock and turn it 45 degrees counter-clockwise. The drive is now locked.



Caution: When in the closed position, the latch handle secures the drive to the chassis. If the handle is closed before the drive is fully inserted, the latch mechanism may not fully engage to secure the drive.

2.1.6 Removable 120-mm Fan

The RES-32XR3/FIO contains three high-speed 120-mm fans. All fans are removable for replacement in case of a fan failure.



Note: Since RES-32XR3/FIO fans are “hot-swappable”, it is not necessary to turn off system power in order to remove and replace a fan, however it may be necessary to pull the unit from the rack to obtain access to the fans. This may affect a decision whether or not to turn off system power.

2.1.6.1 Removing and Installing a 120-mm Fan

Perform the following steps to remove and install a 120-mm fan:

1. On the rear of the chassis, locate the four captive thumb screws for the fan to be replaced. (see *Figure 2-10*).
2. Unscrew the four captive thumb screws and pull the fan out of the chassis.

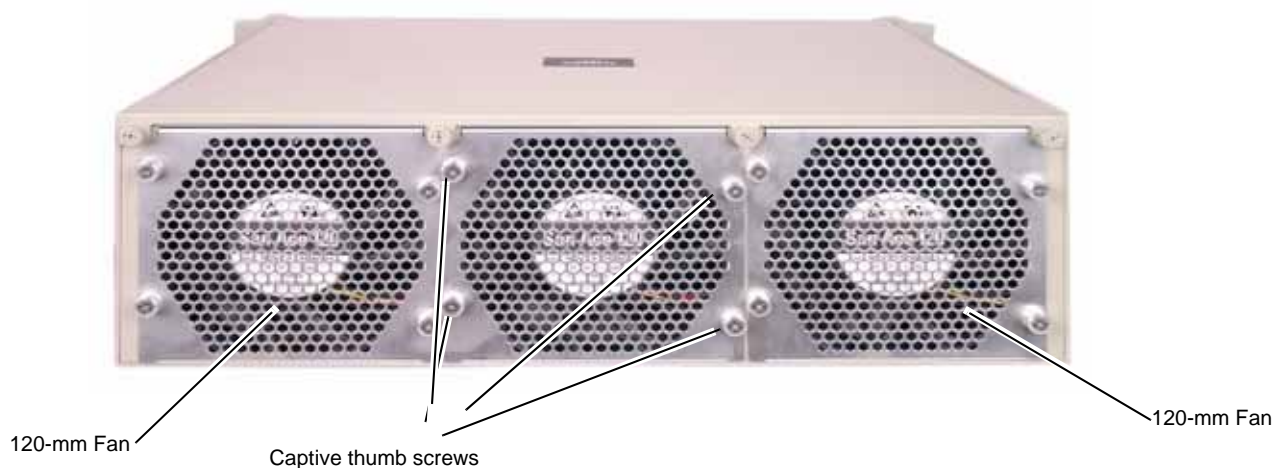


Figure 2-10. The RES-32XR3/FIO 120-mm Fans

3. When the fan is removed, its 4-wire connector will automatically disconnect from the chassis. Insert the replacement fan carefully into the empty fan slot until it is flush with the second fan. The 4-wire connector will automatically engage its counterpart connector successfully.

2.1.7 Power Supply

Each 750-watt load-sharing (N+1 redundant) power supply can be hot-swapped while the system is still on and operational.

2.1.7.1 Removing a Power Supply

Perform the following steps to remove a power supply:

1. Remove the two captive Phillips screws holding the power supply locking bracket to the chassis. Store the bracket for later use (see **A** in *Figure 2-11*).
2. Put the right index finger on the power supply extraction handle and the right thumb on the bottom side of the power supply locking lever.
3. Squeeze the locking lever toward the pull handle and firmly pull the power supply from the chassis.

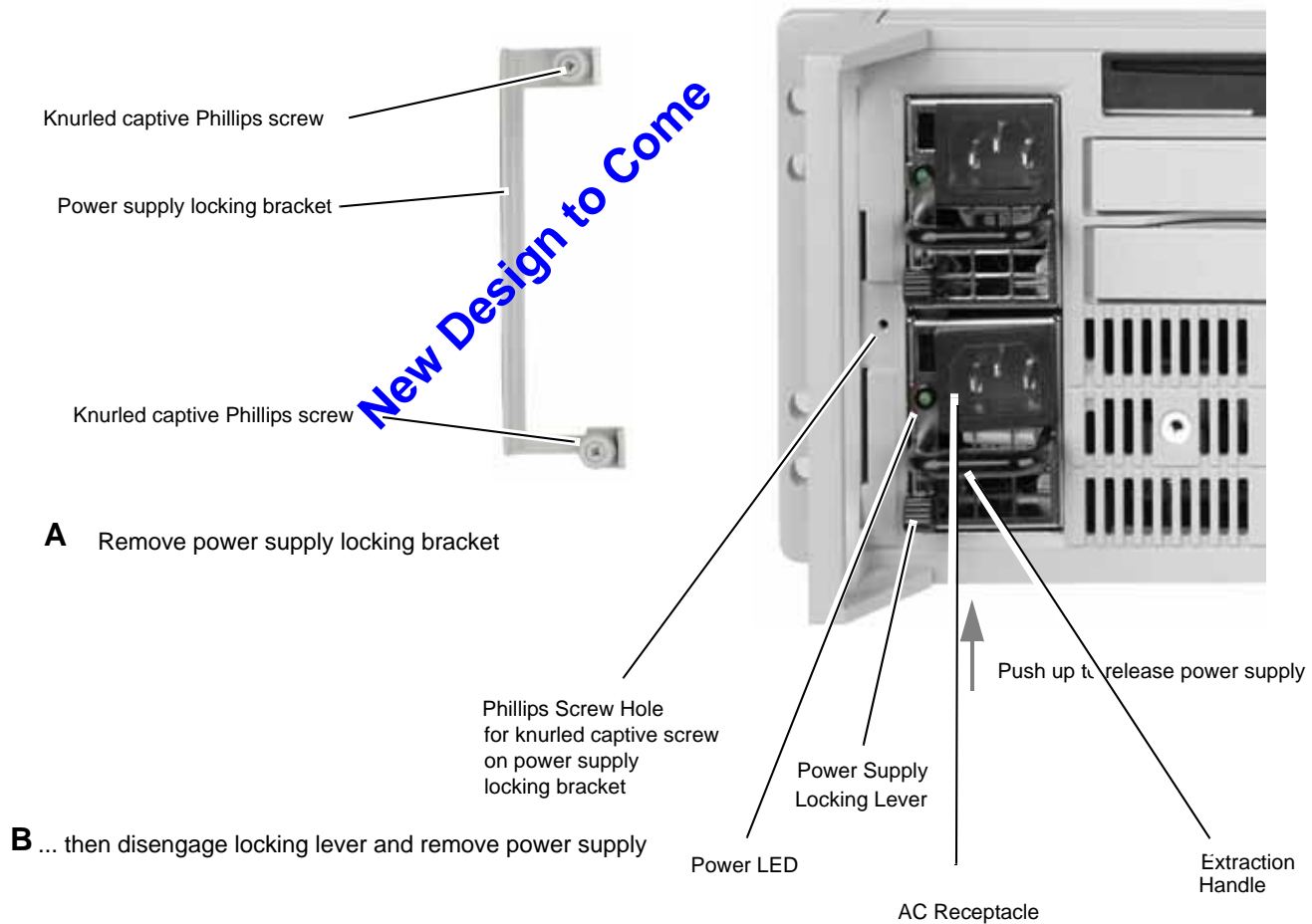


Figure 2-11. The RES-32XR3/FIO Power Supply Locking Mechanism



Caution: When pulling the power supply from the chassis, hold it at the bottom to prevent it from falling and damaging the unit.

2.1.7.2 Installing a Power Supply

Perform the following steps to install a power supply:

1. Insert the replacement power supply into an empty slot with the extraction handle horizontal, (see *Figure 2-11* on page 2-13).
2. Push the power supply carefully into its slot until it is firmly seated (a click will be heard when the locking lever is securely fastened to the chassis).
3. Replace the power supply locking bracket and tighten the two captive Phillips screws (see *Figure 2-11*) to secure both power supplies

2.2 Rack Mounts

2.2.1 Mounting Brackets

The rack-mount brackets (flanges) are used to secure the chassis to the 19" rack (see *Figure 2-12*). Handles are used to pull the RES-32XR3/FIO from the rack when rack-mount slides have been installed on the sides of the chassis (see following section).

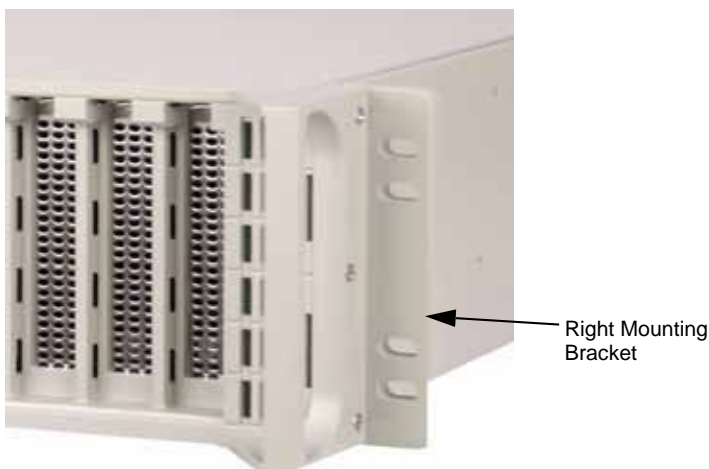


Figure 2-12. Right Rack-Mount Bracket

2.2.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-32XR3/FIO for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and should be ordered at the time your system is purchased.

To learn how to install rack-mount slides, refer to Appendix B, “Rack-Mount Slide Installation”.



Caution: Any screws used to mount a slide to a RES-32XR3/FIO chassis must not exceed a length of 3/8” to prevent excessive penetration of the chassis.

2.3 Operation

2.3.1 Plugging in the AC Power Cords

Before powering on the RES-32XR3/FIO, plug in the AC power cords as follows:

- Plug an AC power cord (shipped with unit) into the AC power socket on each power supply on the front of the RES-32XR3/FIO, (see *Figure 2-13*).

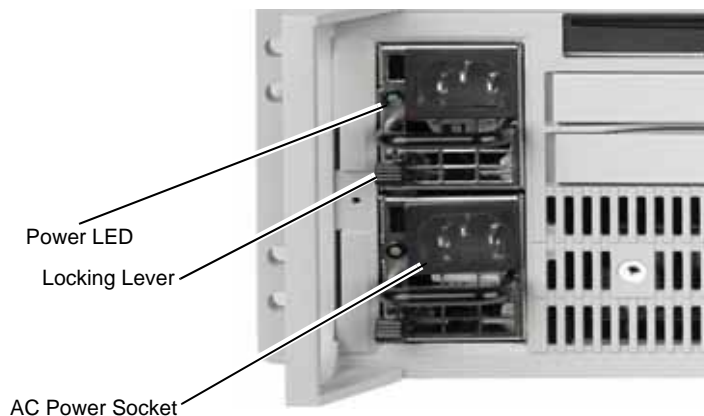


Figure 2-13. AC Power Socket and LED on the RES-32XR3/FIO

2.3.2 Getting Started

2.3.2.1 Configuration

1. Make sure all storage drives are installed (see “SATA Storage Drive”, page 2-9). Drive ID numbers are shown in *Figure 2-8* on page 2-9. Changes may be made through the BIOS.
2. Connect a multiscan monitor to the VGA connector.
3. Attach a PS/2 keyboard and mouse to the appropriate connectors on the front I/O panel of the RES-32XR3/FIO (see *Figure 1-5* on page 1-7)

2.3.2.2 Turning The System On

1. Plug the AC power cord from each of the RES-32XR3/FIO power supplies into a “live” AC outlet. The LED on each power supply will turn on when AC power is enabled.
2. On the front of the RES-32XR3/FIO push the system power on/off button (see *Figure 2-14*). This will cause the system POWER LED to light (green).

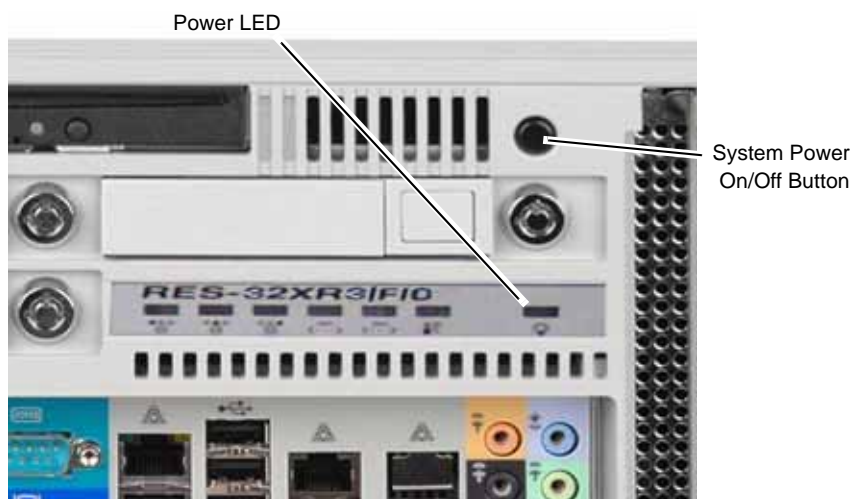


Figure 2-14. System Power Button and LED on the RES-32XR3/FIO Front

2.3.2.3 Linux Installation

The subject of installing the Linux operating system onto the RES-32XR3/FIO is detailed in Appendix C, “Red Hat Enterprise Linux 5 Installation”.

2.3.3 Turning the System Off



Caution: Before turning your system off, make sure to save all open files, properly close applications, and broadcast a warning to all users on any active networks.

1. To turn the RES-32XR3/FIO power off, press and hold the system power on/off button (see *Figure 2-14*, page 2-16) for at least four (4) seconds. This will shut down the system and turn off the POWER LED.

As an alternative, a modern operating system (Windows 9x or newer and Linux, for example) can turn off the system after a graceful OS software shutdown.

BIOS Setup Utility

3.1 Introduction

This chapter describes the AMI BIOS Setup Utility for the RES-32XR3/FIO motherboard.

3.1.1 Starting BIOS Setup Utility

To enter the AMI BIOS Setup Utility screens, press the <Delete> key while the system is booting up.



Note: In most cases, the <Delete> key is used to invoke the AMI BIOSsetup screen. There are a few cases when other keys are used, such as <F1>, <F2>, etc.

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.



Note: The AMI BIOS has default text messages built in. Themis retains the option to include, omit, or change any of these text messages.

The AMI BIOS Setup Utility uses a key-based navigation system called “hot keys”. Most of the AMI BIOS setup utility “hot keys” can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, arrow keys, etc.



Note: Options printed in **Bold** are default settings.

3.1.2 How To Change the Configuration Data

The configuration data that determines the system parameters may be changed by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing at the appropriate time during system boot.

3.1.3 Starting the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup Utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen below the copyright message.



Caution: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Themis be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

3.2 Main Setup

When you first enter the AMI BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown below.

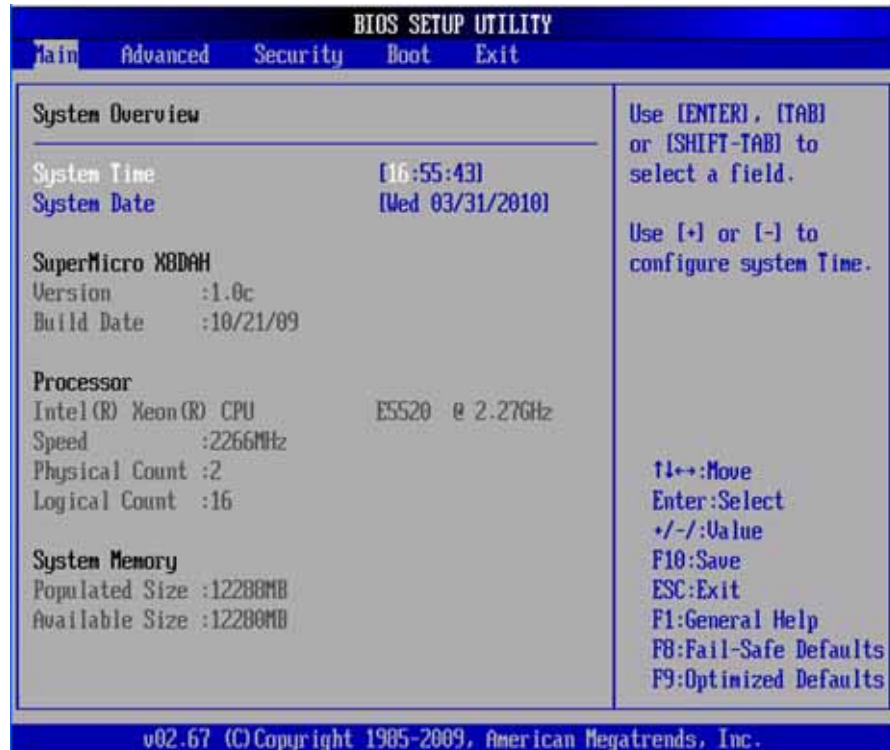


Figure 3-1. Main BIOS Setup Screen

3.2.1 System Time/System Date

Use this option to change the system time and date. Highlight *System Time* or *System Date* using the arrow keys. Key in new values through the keyboard and press <Enter>. Press the <Tab> key to move between fields. The date must be entered in Day MM/DD/YY format. The time is entered in HH:MM:SS format.



Note: The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00.

3.2.2 Supermicro X8DAH

- Version: This item displays the BIOS revision used in your system.
- Build Date: This item displays the date when this BIOS was completed.

3.2.3 Processor

The AMI BIOS will automatically display the status of the processor used in your system:

- CPU Type: This item displays the type of CPU used in the motherboard.
- Speed: This item displays the speed of the CPU detected by the BIOS.
- Physical Count: This item displays the number of processors installed in your system as detected by the BIOS.
- Logical Count: This item displays the number of CPU Cores installed in your system as detected by the BIOS.

3.2.4 System Memory

This displays the size of memory available in the system:

- Populated Size: This item displays the installed memory size detected by the BIOS.
- Available Size: This item displays the available memory detected by the BIOS.

3.3 Advanced Setup Configurations

Use the arrow keys to select Advanced Setup and hit <Enter> to access the submenu items:

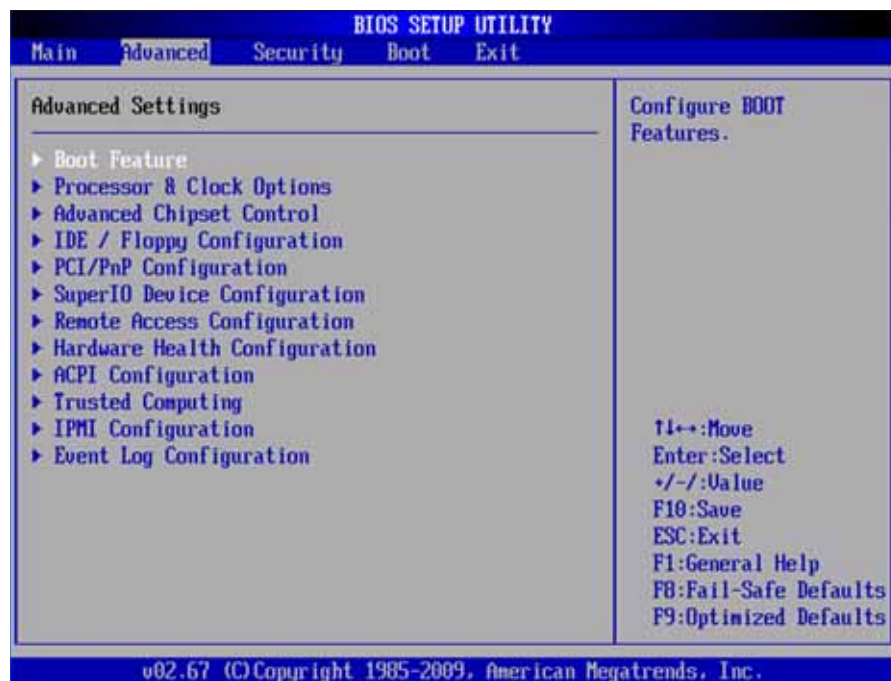


Figure 3-2. Advanced Settings

3.3.1 Boot Features

3.3.1.1 Quick Boot

If Enabled, this option will skip certain tests during POST to reduce the time needed for system boot. The options are **Enabled** and Disabled.

3.3.1.2 Quiet Boot

This option allows the bootup screen options to be modified between POST messages or the OEM logo. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are **Enabled** and Disabled.

3.3.1.3 AddOn ROM Display Mode

This sets the display mode for Option ROM. The options are **Force BIOS** and **Keep Current**.

3.3.1.4 Bootup Num-Lock

This feature selects the Power-on state for the Numlock key. The options are **Off** and **On**.

3.3.1.5 PS/2 Mouse Support

This feature enables support for the PS/2 mouse. The options are **Disabled**, **Enabled**, and **Auto**.

3.3.1.6 Wait For 'F1' If Error

This forces the system to wait until the 'F1' key is pressed if an error occurs. The options are **Disabled** and **Enabled**.

3.3.1.7 Hit 'Del' Message Display

This feature displays “Press DEL to run Setup” during POST. The options are **Enabled** and **Disabled**.

3.3.1.8 Watch Dog Function

If enabled, the Watch Dog Timer will allow the system to reboot when it is inactive for more than 5 minutes. The options are **Enabled** and **Disabled**.

3.3.1.9 Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select **Power-Off** for the power to remain off after a power loss. Select **Power-On** for the power to be turned on after a power loss. Select **Last State** to allow the system to resume its last state before a power loss. The options are **Power-On**, **Power-Off** and **Last State**.

3.3.1.10 Interrupt 19 Capture

Interrupt 19 is the software interrupt that handles the boot drive function. When this item is set to **Enabled**, the ROM BIOS of the host adaptors will “capture” Interrupt 19 at boot and allow the drives that are attached to these host adaptors to function as bootable drives. If this item is set to **Disabled**, the ROM BIOS of the host adaptors

will not capture Interrupt 19, and the drives attached to these adaptors will not function as bootable devices. The options are **Enabled** and Disabled.

3.3.2 Processor and Clock Options

This submenu allows the user to configure the Processor and Clock settings.

3.3.2.1 CPU Ratio

If set to Manual, this option allows the user to set the ratio between the CPU Core Clock and the FSB Frequency. The options are **Auto** and Manual.



Note: If an invalid ratio is entered, the AMI BIOS will restore the setting to the previous state.

3.3.2.2 Ratio CMOS Setting (Available when the item-CPU Ratio is set to Manual)

If CPU Ratio is set to Manual (above), this option allows the user to set the ratio between the CPU Core Clock and the FSB Frequency. The default setting depends on the type of CPU installed on the motherboard. The default setting for the CPU installed in your motherboard is **[21]**. Press “+” or “-” on your keyboard to change this value.

3.3.2.3 Clock Spread Spectrum

Select Enable to use the feature of Clock Spectrum, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are **Disabled** and Enabled.

3.3.2.4 Hardware Prefetcher (Available when supported by the CPU)

If set to Enabled, the hardware prefetcher will prefetch streams of data and instructions from the main memory to the L2 cache in the forward or backward manner to improve CPU performance. The options are Disabled and **Enabled**.

3.3.2.5 Adjacent Cache Line Prefetch (Available when supported by the CPU)

The CPU fetches the cache line for 64 bytes if this option is set to Disabled. The

CPU fetches both cache lines for 128 bytes as comprised if **Enabled**.

3.3.2.6 Intel® Virtualization Technology (Available when supported by the CPU)

Select Enabled to use the feature of Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, creating multiple “virtual” systems in one physical computer. The options are Enabled and **Disabled**.



Note: If there is any change to this setting, you will need to power off and restart the system for the change to take effect. Please refer to Intel’s website for detailed information.

3.3.2.7 Execute-Disable Bit Capability (Available when supported by the OS and the CPU)

Set to Enabled to enable the Execute Disable Bit which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor or damage the system during an attack. The default is **Enabled**. (Refer to Intel and Microsoft Web Sites for more information.)

3.3.2.8 Simultaneous Multi-Threading (Available when supported by the CPU)

Set to Enabled to use the Simultaneous Multi-Threading Technology, which will result in increased CPU performance. The options are Disabled and **Enabled**.

3.3.2.9 Active Processor Cores

Set to Enabled to use a processor's Second Core and beyond. (Please refer to Intel's web site for more information.) The options are **All**, 1 and 2.

3.3.2.10 Intel® EIST Technology

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. (Please refer to Intel’s web site for detailed information.) The options are Disabled and **Enabled**.

3.3.2.11 C1E Support

Select Enabled to use the feature of Enhanced Halt State. C1E significantly reduces the CPU's power consumption by reducing the CPU's clock cycle and voltage during a "Halt State." The options are Disabled and **Enabled**.

3.3.2.12 Intel® C-STATE Tech

If enabled, C-State is set by the system automatically to either C2, C3 or C4 state. The options are Disabled and **Enabled**.

3.3.2.13 C-State package limit setting (Available when Intel® C-State Tech is enabled)

If set to Auto, the AMI BIOS will automatically set the limit on the C-State package register. The options are **Auto**, C1, C3, C6 and C7.

3.3.2.14 C1 Auto Demotion

When enabled, the CPU will conditionally demote C3, C6 or C7 requests to C1 based on un-core auto-demote information. The options are Disabled and **Enabled**.

3.3.2.15 C3 Auto Demotion

When enabled, the CPU will conditionally demote C6 or C7 requests to C3 based on un-core auto-demote information. The options are Disabled and **Enabled**.

3.3.3 DCA Technology

This feature accelerates the performance of TOE devices. For this motherboard,



Note: A TOE device is a specialized, dedicated processor that is installed on an add-on card or a network card to handle some or all packet processing of this add-on card.

the TOE device is built inside the ESB 2 South Bridge chip. This feature is supported only by some types of processors (i.e., Intel Nehalem-WS 1S). The options are **Enabled** and Disabled.

3.3.3.1 DCA Prefetch Delay

A DCA Prefetch is used with TOE components to prefetch data in order to shorten

execution cycles and maximize data processing efficiency. Prefetching too frequently can saturate the cache directory and delay necessary cache accesses. This feature reduces or increases the frequency the system prefetches data. The options are [8], [16], [32], [40], [48], [56], [64], [72], [80], [88], [96], [104], [112], [120]

3.3.4 Advanced Chipset Control

The items included in the Advanced Settings submenu are listed below:

QPI & IMC Configuration

3.3.4.1 QPI Links Speed

This feature selects QPI's data transfer speed. The options are Slow-mode, and **Full Speed**.

3.3.4.2 QPI Frequency

This selects the desired QPI frequency. The options are **Auto**, 4.800 GT, 5.866GT, 6.400 GT.

3.3.4.3 QPI L0s and L1

This enables the QPI power state to low power. L0s and L1 are automatically selected by the motherboard. The options are **Disabled** and Enabled.

3.3.4.4 Memory Frequency

This feature forces a DDR3 frequency slower than what the system has detected. The available options are **Auto**, Force DDR-800, Force DDR-1066, and Force DDR-1333.

3.3.4.5 Memory Mode

The options are **Independent**, Channel Mirror, and Lockstep.and Sparing.

- *Independent* - All DIMMs are available to the operating system.
- *Channel Mirror* - The motherboard maintains two identical copies of all data in memory for redundancy.
- *Lockstep* - The motherboard uses two areas of memory to run the same set of

operations in parallel.

- *Sparing* - A preset threshold of correctable errors is used to trigger fail-over. The spare memory is put online and used as active memory in place of the failed memory.

3.3.4.6 Demand Scrubbing

A memory error-correction scheme where the Processor writes corrected data back into the memory block from where it was read by the Processor. The options are **Enabled** and Disabled.

3.3.4.7 Patrol Scrubbing

A memory error-correction scheme that works in the background looking for and correcting resident errors. The options are **Enabled** and Disabled.

3.3.4.8 Throttling - Closed Loop / Throttling - Open Loop

Throttling improves reliability and reduces power in the processor by automatic voltage control during processor idle states. Available options are **Disabled** and Enabled. If Enabled, the following items will appear:

Hysteresis Temperature (Closed Loop only)

Temperature Hysteresis is the temperature lag (in degrees Celsius) after the set DIMM temperature threshold is reached before Closed Loop Throttling begins. The options are **Disabled**, 1.5°C, 3.0°C, and 6.0°C.

Guardband Temperature (Closed Loop only)

This is the temperature which applies to the DIMM temperature threshold. Each step is in 0.5°C increment. The default is **[006]**. Press “+” or “-” on your keyboard to change this value.

Inlet Temperature

This is the temperature detected at the chassis inlet. Each step is in 0.5°C increment. The default is **[070]**. Press “+” or “-” on your keyboard to change this value.

Temperature Rise

This is the temperature rise to the DIMM thermal zone. Each step is in 0.5°C increment. The default is **[020]**. Press “+” or “-” on your keyboard to change this value.

Air Flow

This is the air flow speed to the DIMM modules. Each step is one mm/sec. The default is **[1500]**. Press “+” or “-” on your keyboard to change this value.

Altitude

This feature defines how many meters above or below sea level the system is located. Options are **Sea Level or Below**, 1~300, 301~600, 601~900, 901~1200, 1201~1500, 1501~1800, 1801~2100, 2101~2400, 2401~2700, and 2701~3000.

DIMM Pitch

This is the physical space between each DIMM module. Each step is in 1/1000 of an inch. The default is **[400]**. Press “+” or “-” on your keyboard to change this value.

3.3.4.9 HDA Controller

Select Enabled to activate the onboard High-Definition Audio controller. The options are **Enabled** and Disabled.

3.3.4.10 Intel VT-d

Select Enabled to enable Intel's Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to VMM through the DMAR ACPI Tables. This feature offers fully-protected I/O resource-sharing across the Intel platforms, providing the user with greater reliability, security and availability in networking and data-sharing. The settings are Enabled and **Disabled**.

3.3.4.11 SR-IOV Support

Single Root I/O Virtualization is an industry-standard mechanism that allow devices to advertise their capability to be simultaneously shared among several virtual machines. SR-IOV is capable of partitioning a PCI function into several virtual interfaces for sharing the resources of a PCI Express (PCI-E) device under a virtual environment. The options are **Disabled** and Enabled.

3.3.4.12 NUMA Support

Select Enabled to use the feature of Non-Uniform Memory Access to improve CPU performance. The options are Enabled and **Disabled**.

3.3.4.13 Intel I/OAT

The Intel I/OAT (I/O Acceleration Technology) significantly reduces CPU overhead by leveraging CPU architectural improvements, freeing resources for other tasks. The options are Disabled and **Enabled**.

3.3.4.14 Active State Power Management

Select Enabled to start Active-State Power Management for signal transactions between L0 and L1 Links on the PCI Express Bus. This maximizes power-saving and transaction speed. The options are Enabled and **Disabled**.

3.3.4.15 Route Port 80h Cycles to

This feature allows the user to decide which bus to send debug information to. The options are **LPC** and PCI.

3.3.4.16 USB Functions

This feature allows the user to decide the number of onboard USB ports to be enabled. The Options are: Disabled, 2 USB ports, 4 USB ports, 6 USB ports, 8 USB ports, 10 USB ports and **12 USB ports**.

3.3.4.17 USB 2.0 Controller

Select Enabled to activate the onboard USB 2.0 controller. The options are **Enabled** and Disabled.

3.3.4.18 Legacy USB Support

Select Enabled to use Legacy USB devices. If this item is set to Auto, Legacy USB support will be automatically enabled if a legacy USB device is installed on the motherboard, and vice versa. The settings are Disabled, Enabled and **Auto**.

3.3.5 IDE/Floppy Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the IDE devices and displays the following items:

3.3.5.1 Floppy A

This feature allows the user to select the type of floppy drive connected to the system as specified. The options are Disabled, 360KB 5 1/4", 1.2MB 5 1/4", 720KB 3 1/2", 1.44MB 3 1/2" and 2.88MB 3 1/2". The default setting for Floppy A is **1.44MB 3 1/2"**, and for Floppy B is **Disabled**.

3.3.5.2 SATA#1 Configuration

If Compatible is selected, it sets SATA#1 to legacy compatibility mode, while selecting Enhanced sets SATA#1 to native SATA mode. The options are Disabled, Compatible and **Enhanced**.

Configure SATA#1

This feature allows the user to select the drive type for SATA#1. The options are **IDE**, RAID and AHCI. (When the option-RAID is selected, the item-ICH RAID Code Base will appear.

ICH RAID Code Base (This feature is available when the option-RAID is selected)

Select Intel to enable Intel's SATA RAID firmware to configure Intel's SATA RAID settings. Select Adaptec to enable Adaptec's SATA RAID firmware to configure Adaptec's SATA RAID settings. The options are **Intel** and Adaptec.

SATA#2 Configuration (This feature is available when the option-IDE is selected for SATA#1)

Selecting Enhanced will set SATA#2 to native SATA mode. The options are Disabled, and **Enhanced**.

3.3.5.3 IDE Detect Timeout (sec)

Use this feature to set the time-out value for the BIOS to detect the ATA, ATAPI devices installed in the system. The options are 0 (sec), 5, 10, 15, 20, 25, 30, and **35**.

3.3.5.4 Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Master, and Fourth IDE Master

These settings allow the user to set the parameters of Primary IDE Master/Slave,

Secondary IDE Master/Slave, Third and Fourth IDE Master slots. Hit <Enter> to activate the following submenu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the submenu are:

Type

Select the type of device connected to the system. The options are Not Installed, **Auto**, CD/DVD and ARMD.

LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a storage drive. In the LBA mode, the maximum drive capacity is 137 GB. For drive capacities over 137 GB, your system must be equipped with a 48-bit LBA mode addressing. If not, contact your manufacturer or install an ATA/133 IDE controller card that supports 48-bit LBA mode. The options are Disabled and **Auto**.

Block (Multi-Sector Transfer)

Block Mode boosts the IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if Block Mode is not used. Block Mode allows transfers of up to 64 KB per interrupt. Select Disabled to allow data to be transferred from and to the device one sector at a time. Select Auto to allow data transfer from and to the device occur multiple sectors at a time if the device supports it. The options are **Auto** and Disabled.

PIO Mode

The IDE PIO (Programmable I/O) Mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The options are **Auto** 0, 1, 2, 3, and 4.

Select Auto to allow the AMI BIOS to automatically detect the PIO mode. Use this value if the IDE storage drive support cannot be determined.

Select 0 to allow the AMI BIOS to use PIO mode 0. It has a data transfer rate of 3.3 MBs.

Select 1 to allow the AMI BIOS to use PIO mode 1. It has a data transfer rate of 5.2 MBs.

Select 2 to allow the AMI BIOS to use PIO mode 2. It has a data transfer rate of 8.3 MBs.

Select 3 to allow the AMI BIOS to use PIO mode 3. It has a data transfer rate of 11.1 MBs.

Select 4 to allow the AMI BIOS to use PIO mode 4. It has a data transfer bandwidth of 32-Bits. Select Enabled to enable 32-Bit data transfer.

DMA Mode

Select Auto to allow the BIOS to automatically detect IDE DMA mode when the IDE storage drive support cannot be determined.

Select SWDMA0 to allow the BIOS to use Single Word DMA mode 0. It has a data transfer rate of 2.1 MBs.

Select SWDMA1 to allow the BIOS to use Single Word DMA mode 1. It has a data transfer rate of 4.2 MBs.

Select SWDMA2 to allow the BIOS to use Single Word DMA mode 2. It has a data transfer rate of 8.3 MBs.

Select MWDMA0 to allow the BIOS to use Multi Word DMA mode 0. It has a data transfer rate of 4.2 MBs.

Select MWDMA1 to allow the BIOS to use Multi Word DMA mode 1. It has a data transfer rate of 13.3 MBs.

Select MWDMA2 to allow the BIOS to use Multi-Word DMA mode 2. It has a data transfer rate of 16.6 MBs.

Select UDMA0 to allow the BIOS to use Ultra DMA mode 0. It has a data transfer rate of 16.6 MBs. It has the same transfer rate as PIO mode 4 and Multi Word DMA mode 2.

Select UDMA1 to allow the BIOS to use Ultra DMA mode 1. It has a data transfer rate of 25 MBs.

Select UDMA2 to allow the BIOS to use Ultra DMA mode 2. It has a data transfer rate of 33.3 MBs.

Select UDMA3 to allow the BIOS to use Ultra DMA mode 3. It has a data transfer rate of 66.6 MBs.

Select UDMA4 to allow the BIOS to use Ultra DMA mode 4. It has a data transfer rate of 100 MBs.

Select UDMA5 to allow the BIOS to use Ultra DMA mode 5. It has a data transfer rate of 133 MBs.

Select UDMA6 to allow the BIOS to use Ultra DMA mode 6. It has a data transfer rate of 133 MBs. The options are **Auto**, SWDMA_n, MWDMA_n, and UDMA_n.

S.M.A.R.T. For Storage drives

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select Auto to allow the AMI BIOS to automatically detect storage drive support. Select Disabled to prevent the AMI BIOS from using the S.M.A.R.T. Select Enabled to allow the AMI BIOS to use the S.M.A.R.T. to support storage drives. The options are Disabled, Enabled, and **Auto**.

32-Bit Data Transfer

Select Enable to enable the function of 32-bit IDE data transfer. The options are **Enabled** and Disabled.

3.3.6 PCI/PnP Configuration

3.3.6.1 Clear NVRAM

This feature clears the NVRAM during system boot. The options are **No** and Yes.

3.3.6.2 Plug & Play OS

Selecting Yes allows the OS to configure Plug & Play devices. (This is not required for system boot if your system has an OS that supports Plug & Play.) Select **No** to allow the AMI BIOS to configure all devices in the system.

3.3.6.3 PCI Latency Timer

This feature sets the latency Timer of each PCI device installed on a PCI bus. Select 64 to set the PCI latency to 64 PCI clock cycles. The options are 32, **64**, 96, 128, 160, 192, 224 and 248.

3.3.6.4 PCI IDE BusMaster

When enabled, the BIOS uses PCI bus mastering for reading/writing to IDE drives. The options are Disabled and **Enabled**.

3.3.6.5 PCI-E I/O Performance

This feature sets the PCI-E maximum payload size. The options are **128B** and 256B.

3.3.6.6 PCI-E Slot 1 x8, PCI-E Slot 2 x16, PCI-E Slot 3 x8, PCI-E Slot 4 x8 (in x16 slot), PCI-E Slot 5 PCI-E x4 (in x8 slot), PCI-E Slot 6 x16, PCI-E Slot 7 x8.

This feature allows you to Enable or Disable any of the PCI slots. The options are **Enable** and **Disable**.

3.3.6.7 Onboard LAN Option ROM Select

Select the onboard LAN option ROM type. The options are iSCSI and **PXE**.

3.3.6.8 Load Onboard LAN1 Option ROM/Load Onboard LAN2 Option ROM

Select Enabled to enable the onboard LAN1 or LAN2 Option ROM. This is to boot computer using a network interface. The options are Enabled and **Disabled**.

3.3.6.9 Boot Graphics Adapter Priority

This feature allows the user to select the priority graphics adapter for system boot. The options are Auto and **Onboard VGA**.

3.3.7 Super IO Device Configuration

3.3.7.1 Serial Port1 Address/Serial Port2 Address

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1 and Serial Port 2. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable. Select 3F8/IRQ4 to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. The options for Serial Port 1 are Disabled, **3F8/IRQ4**, 3E8/IRQ4, 2E8/IRQ3. The options for Serial Port 2 are Disabled, **2F8/IRQ3**, 3E8/IRQ4, and 2E8 IRQ3.

Serial Port 2 Mode

This feature allows the user to set the mode for Serial Port B. The options are **Normal**, IR (Infra-Red) and ASK-IR.

3.3.7.2 Onboard Floppy Controller

Select Enabled to enable the onboard floppy controller. The options are Disabled and **Enabled**.

3.3.8 Remote Access Configuration

3.3.8.1 Remote Access

This allows the user to enable the Remote Access feature. The options are **Disabled** and Enabled.

If Remote Access is set to Enabled, the following items will display:

3.3.8.2 Serial Port Number

This feature allows the user to decide which serial port to be used for Console Redirection. The options are **COM 1** and COM 2.

Base Address, IRQ

This item displays the based address and IRQ of the serial port specified above.

3.3.8.3 Serial Port Mode

This feature allows the user to set the serial port mode for Console Redirection. The options are **115200 8, n 1**; 57600 8, n, 1; 38400 8, n, 1; 19200 8, n, 1; and 9600 8, n, 1.

3.3.8.4 Flow Control

This feature allows the user to set the flow control for Console Redirection. The options are **None**, Hardware, and Software.

3.3.8.5 Redirection After BIOS POST

Select Disabled to turn off Console Redirection after Power-On Self-Test (POST).

Select Always to keep Console Redirection active all the time after POST.



Note: This setting may not be supported by some operating systems.

Select Boot Loader to keep Console Redirection active during POST and Boot Loader. The options are Disabled, Boot Loader, and **Always**.

3.3.8.6 Terminal Type

This feature allows the user to select the target terminal type for Console Redirection. The options are ANSI, **VT100**, and VT-UTF8.

3.3.8.7 VT-UTF8 Combo Key Support

A terminal keyboard definition that provides a way to send commands from a remote console. Available options are **Enabled** and Disabled.

3.3.8.8 Sredir Memory Display Delay

This feature defines the length of time in seconds to display memory information. The options are **No Delay**, Delay 1 Sec, Delay 2 Sec, and Delay 4 Sec.

3.3.9 Hardware Health Monitor

This feature allows the user to monitor system health and review the status of each item as displayed.

3.3.9.1 CPU Overheat Alarm

This option allows the user to select the CPU Overheat Alarm setting which determines when the CPU OH alarm will be activated to provide warning of possible

CPU overheat.



Caution: 1. Any temperature that exceeds the CPU threshold temperature predefined by the CPU manufacturer may result in CPU overheat or system instability. When the CPU temperature reaches this predefined threshold, the CPU and system cooling fans will run at full speed.

2. To avoid possible system overheating, please be sure to provide adequate airflow to your system.

The options are:

- The Early Alarm: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered as soon as the CPU temperature reaches the CPU overheat threshold as predefined by the CPU manufacturer.
- **The Default Alarm:** Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered when the CPU temperature reaches about 5°C above the threshold temperature as predefined by the CPU manufacturer to give the CPU and system fans additional time needed for CPU and system cooling. In both the alarms above, please take immediate action as shown below.

3.3.9.2 CPU 1 Temperature/CPU 2 Temperature/System Temperature

This feature displays current temperature readings for the CPUs and the System. The following items will be displayed for your reference only:

CPU 1 Temperature/ CPU 2 Temperature

The CPU Temperature feature will display the CPU temperature status as detected by the BIOS:

- **Low** – This level is considered as the ‘normal’ operating state. The CPU temperature is well below the CPU ‘Temperature Tolerance’. The motherboard fans and CPU will run normally as configured in the BIOS (Fan Speed Control). User intervention: No action required.
- **Medium** – The processor is running warmer. This is a ‘precautionary’ level and generally means that there may be factors contributing to this condition, but the CPU is still within its normal operating state and below the CPU ‘Temperature Tolerance’. The motherboard fans and CPU will run normally as configured in the BIOS. The fans may adjust to a faster speed depending on the

Fan Speed Control settings. User intervention: No action is required. However, consider checking the fans and the chassis ventilation for blockage.

- **High** – The processor is running hot. This is a ‘caution’ level since the CPU’s ‘Temperature Tolerance’ has been reached (or has been exceeded) and may activate an overheat alarm. The system may shut down if it continues for a long period to prevent damage to the CPU.

User intervention: If the system buzzer and Overheat LED has activated, take action immediately by checking the system fans, chassis ventilation and room temperature to correct any problems.

Notes:

1. The CPU thermal technology that reports absolute temperatures (Celsius/Fahrenheit) has been upgraded to a more advanced feature by Intel in its newer processors. The basic concept is each CPU is embedded by unique temperature information that the motherboard can read. This ‘Temperature Threshold’ or ‘Temperature Tolerance’ has been assigned at the factory and is the baseline on which the motherboard takes action during different CPU temperature conditions (i.e., by increasing Fan speed, triggering the Overheat Alarm, etc.). Since CPUs can have different ‘Temperature Tolerances’, the installed CPU can now send information to the motherboard what its ‘Temperature Tolerance’ is, and not the other way around. This results in better CPU thermal management.

Supermicro has leveraged this feature by assigning a temperature status to certain thermal conditions in the processor (Low, Medium and High). This makes it easier for the user to understand the CPU’s temperature status, rather than by just simply seeing a temperature reading (i.e., 25°C). The information provided above is for your reference only. For more information on thermal management, please refer to Intel’s Web site at www.Intel.com.

System Temperature:

The system temperature will be displayed (in degrees in Celsius and Fahrenheit) as it is detected by the BIOS.

Fan Speed Readings

This feature displays the fan speed readings from Fan1 through Fan8.

Fan Speed Control Modes

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vice versa. Select Workstation if your system is used as a Workstation. Select Server if your system is used as a Server. Select Full Speed to disable the fan speed control function and allow the onboard fans to constantly run at full speed. The Options are: Full Speed, Server, Workstation/Desktop, and **Super Quiet**.

3.3.9.3 Voltage Readings

The following voltage readings will be displayed.

CPU0 Vcore, CPU1 Vcore, 1.5V, 5V, 5VSB, 12V, 3.3Vcc, 3.3Vsb, and VBAT and Vtt.

3.3.10 ACPI Configuration

Use this feature to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

3.3.10.1 High Performance Event Timer

Select Enabled to activate the High Performance Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are **Enabled** and Disabled.

3.3.10.2 USB Device Wakeup

Select Enable to “wake-up” the system via a USB device when the system is in S3 (Sleep) or S4 (Hibernate) State. The options are Enabled and **Disabled**.

3.3.10.3 PS2 KB/MS Wake Up

Select Enable to “wake-up” the system using either the PS2 keyboard or mouse (if equipped) when the system is in S3 or S4 state. The options are Enabled and **Disabled**.

3.3.10.4 ACPI Aware O/S

Enable ACPI support if it is supported by the OS to control ACPI through the Operating System. Otherwise, disable this feature. The options are **Yes** and **No**.

3.3.10.5 Suspend Mode

This option is used to select the ACPI State that is used for system suspend. The options are **S1 (POS)**, **S3 (STR)** and **Auto**.

S1 (POS) - All processor caches are erased, and stops executing instructions. Power to the CPU(s) and RAM is maintained, but RAM is refreshed.

S3 (STR) - The CPU has no power and the power supply goes on reduced power mode. However, main memory (RAM) is still powered.

3.3.10.6 ACPI APIC Support

Select **Enabled** to include the ACPI APIC Table Pointer in the RSDT (Root System Description Table) pointer list. The options are **Enabled** and **Disabled**.

3.3.10.7 APIC ACPI SCI IRQ

When this item is set to **Enabled**, APIC ACPI SCI IRQ is supported by the system. The options are **Enabled** and **Disabled**.

3.3.10.8 Headless Mode

This feature is used to enable the system to function without a keyboard, monitor and/or mouse attached. The options are **Enabled** and **Disabled**.

3.3.10.9 ACPI Version Features

The options are **ACPI v1.0**, **ACPI v2.0** and **ACPI v3.0**. Please refer to ACPI's website for further explanation: <http://www.acpi.info/>.

3.3.11 Trusted Computing

3.3.11.1 TCG/TPM (Trusted Platform Module) Support

Select **Yes** on this item and enable the TPM jumper on the motherboard to enable TCG (TPM 1.1/1.2)/TPM support in order to improve data integrity and network

security. The options are **No** and Yes. If this feature is set to Yes, the following items will display:

Indicate Physical

Enables indication of physical presence to TPM device each time the system starts. The options are Yes and **No**.

TPM Deactivated

Use this feature to Set or Clear the TPM device. The options are Set, Clear and **Don't Change**.

TPM Owner

Use this feature to Install or Clear the TPM ownership. The options are **Don't Change**, Enable Install, Disable Install and Clear.

Execute TPM Command

Select Enabled to allow the user to change executable TPM commands and TPM settings. Select Don't Change to keep the current TPM settings. The options are **Don't Change**, Enabled, and Disabled.

- **TPM Enable/Disable Status**

This item displays the status of TPM Enabled/Disabled state.

- **TPM Owner Status**

This item displays the status of TPM Ownership

3.3.12 IPMI Configuration

Intelligent Platform Management Interface (IPMI) is a set of common interfaces that IT administrators can use to monitor system health and to manage the system as a whole. For more information on the IPMI specifications, please visit Intel's website at www.intel.com.

3.3.12.1 IPMI Firmware Revision

This item displays the current IPMI firmware revision.

3.3.12.2 Status of BMC

Baseboard Management Controller (BMC) manages the interface between system management software and platform hardware. This is an informational feature which returns the status code of the BMC micro controller.

3.3.13 View BMC System Event Log

This feature displays the BMC System Event Log (SEL). It shows the total number of entries of BMC System Events. To view an event, select an Entry Number and press <Enter> to display the information as shown in the screen.

- Total Number of Entries
- SEL Entry Number
- SEL Record ID
- SEL Record Type
- Timestamp, Generator ID
- Event Message Format User
- Event Sensor Type
- Event Sensor Number
- Event Dir Type
- Event Data

3.3.13.1 Clear BMC System Event Log

Select OK and press the <Enter> key to clear the BMC system log. Select Cancel to keep the BMC System log. The options are **OK** and Cancel.



Caution: Any cleared information is unrecoverable. Make absolutely sure that you no longer need any data stored in the log before clearing the BMC Event Log.

3.3.14 Set LAN Configuration

Set this feature to configure the IPMI LAN adapter with a network address as shown in the following graphics.

3.3.14.1 Channel Number

Enter the channel number for the SET LAN Config command. This is initially set to [01]. Press “+” or “-” on your keyboard to change the Channel Number.

3.3.14.2 Channel Number Status

This feature returns the channel status for the Channel Number selected above: Channel Number is “OK” or “Wrong Channel Number”.

3.3.15 IP Address Source

Select the source of this machine's IP address. If Static is selected, you will need to know and enter manually the IP address of this machine below. If DHCP is selected, the BIOS will search for a DHCP (Dynamic Host Configuration Protocol) server in the network it is attached to, and request the next available IP address. The options are **DHCP** and Static.

The following items are assigned IP addresses automatically if DHCP is selected under IP Address Source above:

IP Address

Enter the IP address for this machine. This should be in decimal and in dotted quad form, (i.e., 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255 as shown in the screen below.

Subnet Mask

Subnet masks tell the network which subnet this machine belongs to. The value of each three-digit number separated by dots should not exceed 255.

Gateway Address

This is the IP address of the gateway in the network. This is usually a router.

3.3.16 Mac Address

The BIOS will automatically enter the Mac address of this machine; however it may be over-ridden. Mac addresses are 6 two-digit hexadecimal numbers (Base 16, 0 ~ 9, A, B, C, D, E, F) separated by dots. (i.e., 00.30.48.D0.D4.60).

3.3.17 SET PEF Configuration

3.3.17.1 PEF Support

Select Enabled to enable the function of Platform Event Filter (PEF) which will interpret BMC events and perform actions based on pre-determined settings or events, and performs actions based on pre-determined settings or 'traps' under IPMI 1.5 specifications. For example, powering the system down or sending an alert when a triggering event is detected. The default is **Disabled**.

The following items will display if this item is set to Enabled.

PEF Action Global Control (Available if PEF Support is enabled)

These are the different actions based on BMC events. The options are **Alert**, Power Down, Reset System, Power Cycle, OEM Action, Diagnostic Interface.

Alert Startup Delay (Available if PEF Support is enabled)

This feature inserts a delay during startup for PEF alerts. The options are Enabled and **Disabled**.

Startup Delay (Available if PEF Support is enabled)

This feature enables or disables startup delay. The options are Enabled and **Disabled**.

Event Message for PEF Action (Available if PEF Support is enabled)

This enables or disables Event Messages for PEF action. Refer to Table 24.6 of the IPMI 1.5 Specification for more information at www.intel.com. The options are **Disabled** and Enabled.

3.3.17.2 BMC Watch Dog Timer Action

This feature allows the BMC to reset or power down the system if the OS hangs or crashes. The options are **Disabled**, Reset System, Power Down, Power Cycle.

BMC Watch Dog TimeOut [Min:Sec]

This option appears if BMC Watch Dog Timer Action (above) is enabled. This is a timed delay in minutes or seconds, before a system power down or reset after an operating system failure is detected. The options are **[5 Min.]**, [1 Min.], [30 Sec], and [10 Sec].

3.3.18 Event Log Configuration

3.3.18.1 View Event Log

Use this option to view the System Event Log.

3.3.18.2 Mark all events as read

This option marks all events as read. The options are OK and Cancel.

3.3.18.3 Clear event log

This option clears the Event Log memory of all messages. The options are OK and **Cancel**.

3.3.18.4 PCI Error Log

Use this option to enable PCI error (PERR) logging. The options are **Yes** and No.

3.4 Security Settings

The AMI BIOS provides a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.



Figure 3-3. Security Settings

3.4.1 Supervisor Password

This item indicates if a Supervisor password has been entered for the system. “Not Installed” means a Supervisor password has not been used.

3.4.2 User Password

This item indicates if a user password has been entered for the system. “Not Installed” means that a user password has not been used.

3.4.3 Change Supervisor Password

Select this feature and press <Enter> to access the submenu, and then type in a new

Supervisor Password.

3.4.4 User Access Level (Available when Supervisor Password is set as above)

Available options are **Full Access**: grants full User read and write access to the Setup Utility, **View Only**: allows access to the Setup Utility but the fields cannot be changed, **Limited**: allows only limited fields to be changed such as Date and Time, **No Access**: prevents User access to the Setup Utility.

3.4.5 Change User Password (Available when a User Password is installed)

Select this feature and press <Enter> to access the submenu, and then type in a new User Password.

3.4.6 Clear User Password (Available only when User Password is installed)

This item allows you to clear a user password after it has been entered.

3.4.7 Password Check (Available when a password is installed)

This item forces the system to prompt for a password only when entering BIOS setup or during each bootup. The options are **Setup** and **Always**.

3.4.8 Boot Sector Virus Protection

When Enabled, the AMI BIOS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the storage drive. The options are **Enabled** and **Disabled**.

3.5 Boot Configuration



Figure 3-4. Boot Settings

Use this feature to configure boot settings.

3.5.1 Boot Device Priority

This feature allows the user to specify the sequence of priority for the Boot Device. The settings are 1st boot device, 2nd boot device, 3rd boot device, 4th boot device, 5th boot device and Disabled.

- 1st Boot Device - [USB: XXXXXXXXXX]
- 2nd Boot Device - [CD/DVD: XXXXXXXXXX]

3.5.2 Storage Drives

This feature allows the user to specify the boot sequence from all available storage drives. The settings are Disabled and a list of all storage drives that have been

detected (i.e., 1st Drive, 2nd Drive, 3rd Drive, etc).

- 1st Drive - [SATA: XXXXXXXXXXXX]

3.5.3 Removable Drives

This feature allows the user to specify the boot sequence from available Removable Drives. The settings are 1st boot device, 2nd boot device, and Disabled.

- 1st Drive - [USB: XXXXXXXXXXXX]
- 2nd Drive

3.5.4 CD/DVD Drives

This feature allows the user to specify the boot sequence from available CD/DVD Drives (i.e., 1st Drive, 2nd Drive, etc.).

3.6 Exit Options

Select the Exit tab from the AMI BIOS Setup Utility screen to enter the Exit BIOS Setup screen.

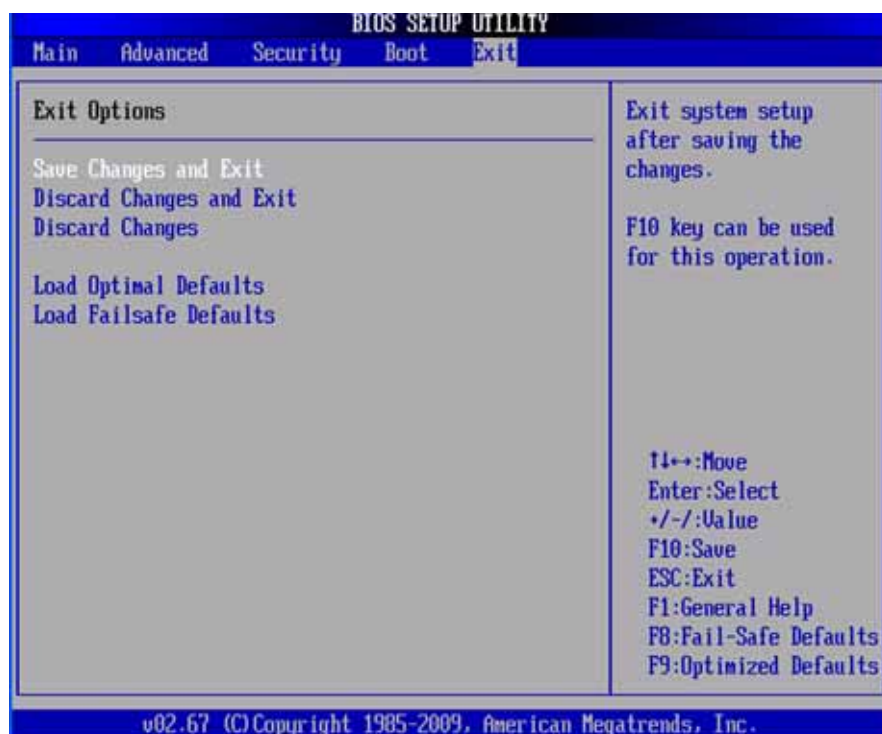


Figure 3-5. Exit Options

3.6.1 Save Changes and Exit

When you have completed the system configuration changes, select this option to leave the BIOS Setup Utility and reboot the computer, so the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

3.6.2 Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

3.6.3 Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS Utility Program.

3.6.4 Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then, select OK to allow the AMI BIOS to automatically load Optimal Defaults to the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

3.6.5 Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not for maximum performance.

3.7 BIOS Recovery



Caution: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Themis be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you need to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

How to Recover the AMIBIOS Image (Main BIOS Block)

An AMIBIOS flash chip consists of a boot sector block, and a main BIOS code block (a main BIOS image). The boot sector block contains critical BIOS code, including memory detection and recovery code to be used to flash a new BIOS image if the original BIOS Image is corrupted. When the system is powered on, the boot sector code executes first. Once it is completed, the main BIOS code will continue with system initialization and complete the bootup process.



Note: BIOS Recovery described below is used when the main BIOS block crashes. However, when the BIOS Boot sector crashes, you will need to send the motherboard back to Supermicro for RMA repairs.

3.7.1 Boot Sector Recovery from a USB Device

This feature allows the user to recover a BIOS image using a USB device without additional utilities needed. A user can download the BIOS image into a USB flash device, and name the file “SUPER.ROM” for the recovery process to load the file. A USB flash device such as a USB Flash Drive, a USB CDROM or a USB CDRW device can be used for this purpose:

1. Insert the USB device that contains the new BIOS image (the ROM files) saved in a root directory into your USB drive.
2. While turning the power on, press and hold <Ctrl> and <Home> at the same time until the USB Access LED Indicator comes on. This might take a few seconds.
3. Once the USB drive LED is on, release the <Ctrl> and <Home> keys. AMI-BIOS will issue beep codes to indicate that the BIOS ROM file is being updated.
4. When BIOS flashing is completed, the computer will reboot. Do not interrupt the flashing process until it is completed.

3.7.2 Boot Sector Recovery from an IDE CD-ROM

This process is almost identical to the process of Boot Sector Recovery from a USB device, except that the BIOS image file is loaded from a CD-ROM. Use a CD-R or CD-RW drive to burn a CD with the BIOS image file in it, and name the file “SUPER.ROM” for the recovery process to load the file.

3.7.3 Boot Sector Recovery from a Serial Port (“Serial Flash”)

This process, also known as “Serial Flash,” allows the user to use a serial port to load a BIOS image for Boot Sector recovery. This feature is usually used for embedded systems that rely on a serial port for remote access and debugging.

3.7.3.1 Requirements

In order to use Serial Flash for Boot Sector Recovery, you will need to meet the following requirements.

- The “Target system,” the system that needs BIOS updates, must have a serial

port and “Serial Flash” support embedded in the BIOS image file.

- The “Host system” should also have a serial port and a terminal program that supports XModem Transfer protocol (Hyper Terminal for the Windows operating systems, and minicom for Linux/FreeSBD, etc.).
- A Null_modem serial cable

How to use Serial Flash for Boot Sector Recovery:

1. Connect a Null_modem serial cable between the target system and the host system that runs the terminal program.
2. Make sure that the new BIOS Image file is accessible for the host system.
3. Start the terminal program on the host system and create a new connection.

Use the following communication parameters for the new connection.

- Bits per second: 115200 bits/sec.
 - Data Bits: 8
 - Parity: None
 - Stop Bit: 1
 - Flow Control: None
4. Power on your system and click the <Connect> button in the Hyper Terminal. The terminal screen will display the following messages.

```
Press <SpaceBar> to update BIOS.  
Confirm update BIOS? (y/n) y  
Begin remote BIOS flash? (y/n) y  
Starting remote flash.  
Upload new BIOS file using Xmodem protocol.
```

5. Follow the instructions given on the screen to update the BIOS. These instructions are also shown below.
 - a. At the prompt, press the <SpaceBar> to update the BIOS.
 - b. When asked to confirm BIOS updating, press <y> to confirm BIOS updates.

- c. Press <y> again to begin flashing BIOS remotely..



Note: Be sure to complete Steps a to c above quickly because you have a second or less to do so.

6. Once you've completed the instructions given, a screen will display to indicate that remote flashing is starting and the new BIOS file is being uploaded.
7. To use Hyper Terminal to transfer the XModem protocol by using the “Send File” dialog under the “Transfer” menu, follow the instructions below to complete XModem transfers.
 - a. Select the “Transfer” menu and enter <Send>.

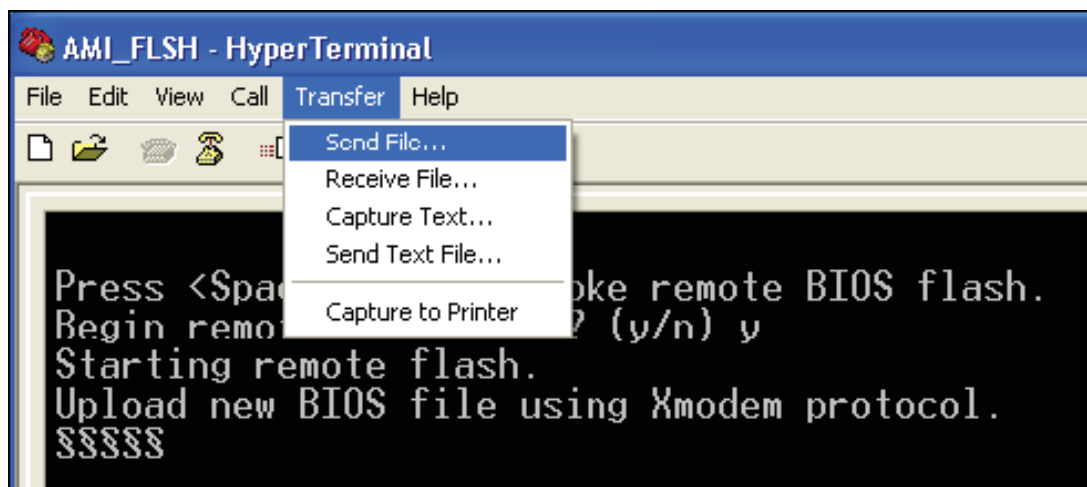


Figure 3-6. AMI_FLASH HyperTerminal

- b. Specify the location of the ROM file and select the proper protocol (XModem).

- c. Press <Send> to start ROM File extraction. (See the picture below.)

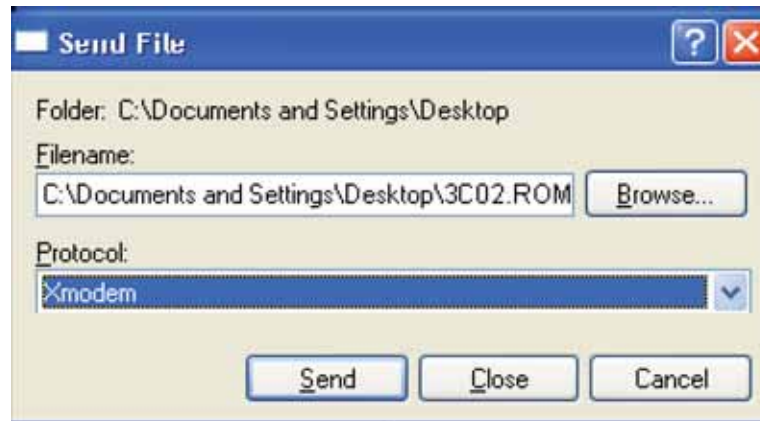


Figure 3-7. ROM File Extraction

- d. Once the ROM file extraction is completed, the message: “New BIOS received OK” will display:

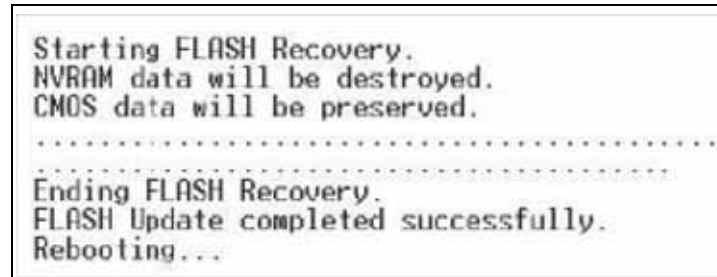


Figure 3-8. Flash Recovery

8. Once remote BIOS flash is completed, the system will reboot.



Note: AMIBIOS Serial Flash will work with any terminal communications program that supports VT-100 and XModem protocols, including protocols designed for GNU/LINUX & BSD operating systems such as minicom. It is recommended that the terminal program be configured to use the 'CR/LF' style of line termination.

3.8 BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed each time the system is powered on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue the boot-up process. The error messages normally appear on the screen.

Fatal errors will not allow the system to continue the boot-up procedure. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The numbers on the fatal error list correspond to the number of beeps for the corresponding error.

BIOS Error Beep Codes		
Beep Code	Error Message	Description
1 beep	Refresh	Circuits have been reset. (Ready to power up)
5 short beeps + 1 long beep	Memory error	No memory detected in the system
8 beeps	Display memory read/write error	Video adapter missing or with faulty memory
1 continuous beep w/Front Panel OH LED on	System Overheat	1 continuous beep with the front panel OH LED on

Table 1: BIOS Error Beep Codes

Appendix A

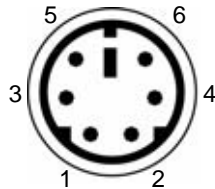
Connector Pinouts

This appendix provides connector pinouts for all standard user I/O interfaces on the front I/O panel of the RES-32XR3/FIO.

A.1 PS/2 Keyboard and Mouse

The RES-32XR3/FIO provides a 6-pin **female** mini-DIN connector for the PS/2 keyboard, and another for the PS/2 mouse. Signals for both connectors are defined in *Table A-1*.

Table A-1. PS/2 Keyboard/Mouse Pinout and Signal Descriptions



Pin	Signal Name
1	Keyboard/mouse data
2	N/C
3	Ground
4	Vcc
5	Keyboard/mouse clock
6	N/C

A.2 USB Ports

The RES-32XR3/FIO supports six USB (Universal Serial Bus) port connectors (see *Figure A-1* for a connector pinout), USB 0 thru USB 5, on the front I/O panel.

Pinout signal descriptions are listed in *Table A-2*.

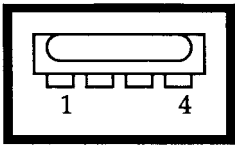


Figure A-1. USB Connector Pinout

Table A-2. USB Connector Pinout Signal Descriptions

Pin	Signal Name	Pin	Signal Name
1	+5V	3	PO+
2	PO–	4	GND

A.3 Serial Port

The RES-32XR3/FIO supports one **male** DB9 serial port connector on the front I/O panel (see *Figure A-2*)—TTYA (COM 1).

COM 1 pinout signal descriptions are listed in *Table A-3*.

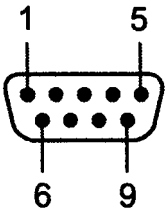


Figure A-2. COM 1 Serial Connector Pinout

Table A-3. COM 1 Serial Connector Pinout Signal Descriptions

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	DCD	4	DTR	7	RTS
2	RXD	5	GND	8	CTS
3	TXD	6	DSR	9	RI

A.4 VGA Display Port

The RES-32XR3/FIO supports a single 15-pin (three 5-pin rows) **female** VGA graphics display port connector on the front I/O panel (see *Figure A-3* for a connector pinout). Pinout signal descriptions are listed in *Table A-4*

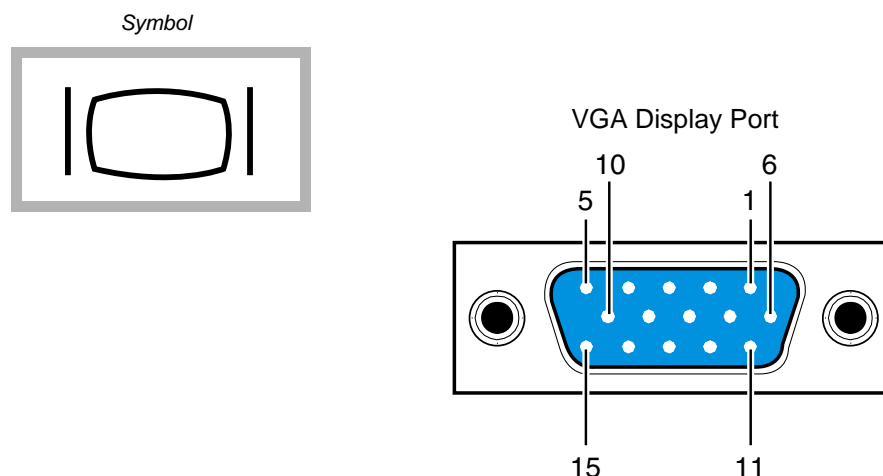


Figure A-3. RES-32XR3/FIO VGA Connector Pinout

Table A-4. RES-32XR3/FIO VGA Connector-Pin Signals

Pin	VGA Signal	Description
1	RED OUT	Red signal output
2	GREEN OUT	Green signal output
3	BLUE OUT	Blue signal output
4	MS2	Monitor ID bit 2
5	GND	Ground (HSync)
6	GND	Red return
7	GND	Green return
8	GND	Blue return

Pin	VGA Signal	Description
9	NC	Key (no pin)
10	GND	Ground (VSync)
11	MS0	Monitor ID bit 0
12	MS1: SDA (DDC Data)	Monitor ID bit 1
13	HSYNC	Horizontal synchronization
14	VSNC	Vertical synchronization
15	MS3: SCL (DDC CLK)	Monitor ID bit 3

A.5 Gigabit Ethernet LAN Ports

The RES-32XR3/FIO supports two RJ45 Gigabit Ethernet LAN port connectors (LAN 1 and LAN 2), each with two embedded LEDs (see *Figure A-4*).

Pinout signal descriptions are listed in *Table A-5*.

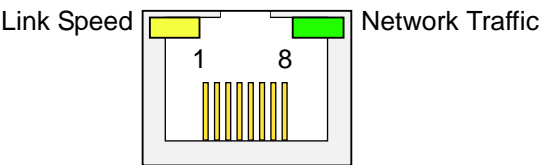


Figure A-4. Ethernet Connector, Type RJ45

Table A-5. RJ45 Ethernet Pinout Signals

Pin	Signal Name	Pin	Signal Name
1	TRD0+	5	TRD2-
2	TRD0-	6	TRD1-
3	TRD1+	7	TRD3+
4	TRD2+	8	TRD3-
<ul style="list-style-type: none">• The color of the left LED indicates the LAN connection speed:<ul style="list-style-type: none">— Off = 10 MHz— Green = 100 MHz— Amber = 1 GHz• The right LED, when lit, indicates LAN activity (network traffic).			

A.6 IPMI Dedicated LAN Port

The single IPMI dedicated Ethernet LAN port on the RES-32XR3/FIO front I/O panel has identical pinout and signal descriptions as the LAN 1 and LAN 2 Ethernet ports described in the previous Section A.5, “Gigabit Ethernet LAN Ports”.

Appendix B

Rack-Mount Slide Installation

An *optional* set of two rack-mount slides (left side and right side) is available for all RES-32 systems, and should be ordered at the time of purchase. The RES-32XR3/FIO chassis contains six threaded screw holes on each side to accommodate #8-32 size screws (included with the rack-mount slide kit); steel slides require four mounting holes, and aluminum slides require three mounting holes (see *Figure B-1*).

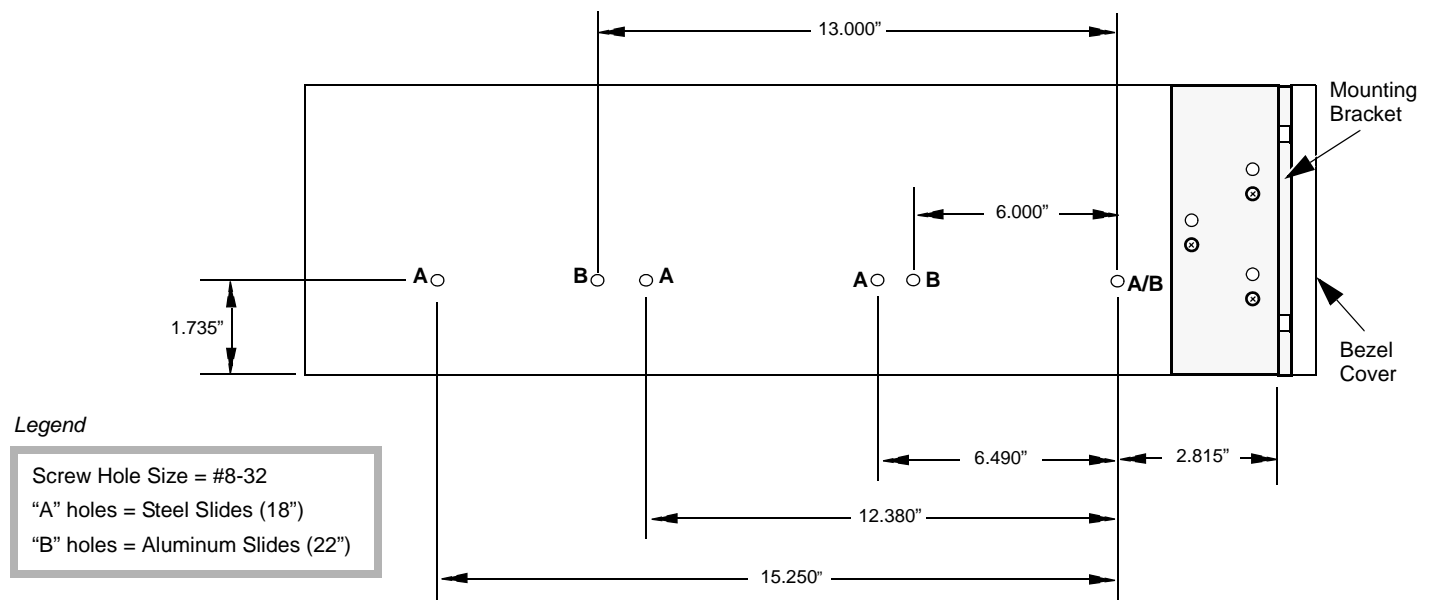


Figure B-1. Screw Locations for Rack-Mount Slides

Dimensions of the screw-hole patterns on the sides of the RES-32XR3/FIO chassis for installing rack-mount slides are shown in *Figure B-1*. Holes for steel slides are marked “A” and holes for aluminum (Jonathan) slides are marked “B”.



Caution: Any screws used to mount a slide to a RES-32 chassis must not exceed a length of 3/8” to prevent excessive penetration of the chassis.

The rack-mount slide installation kit includes the following items:

- a. Two inside slide sections
- b. Two outside slide sections
- c. Two front (short) slide brackets
- d. Two rear (long) slide brackets
- e. Assorted screws, washers, and nuts

Follow these steps to install a steel rack-mount slide to the RES-32XR3/FIO chassis:

1. Attach the inside slide section (see *Figure B-2* on page B-3) to both sides of the RES-32XR3/FIO chassis using four #8-32 screws per side.
2. Measure the depth of the 19” equipment rack into which the RES-32XR3/FIO system will be installed (this can vary from 24” to 30”).
3. Using the depth of the equipment rack, adjust and attach the front and rear slide brackets to the outside slide section using the screws, washers, and nuts provided with the slide kit.
4. With all slide brackets securely attached to both the right and left outside slide sections, install both sections to the inside right and inside left of a 19” rack with two bolts per bracket, making sure there is adequate room for the 3-RU height (5.25”) of a RES-32XR3/FIO system.
5. Carefully insert the RES-32XR3/FIO system into the 19” rack so that the inside slides on both sides of the chassis travel smoothly into the channels of the outside slide sections. Push the system into the rack until the mounting brackets on the front of the chassis are flush with the front of the rack.
6. Secure the RES-32XR3/FIO system to the 19” rack with two bolts on each side.

C

Appendix

Red Hat Enterprise Linux 5 Installation

C.1 Introduction

Welcome to the Red Hat® Enterprise Linux® Installation Guide. This guide contains useful information to assist you during the installation of Red Hat Enterprise Linux via DVD device, from fundamental concepts such as installation preparation to the step-by-step installation procedure.

C.2 Installation

C.2.1 Step 1.



Figure C-1. Power On after Linux DVD is Inserted into Drive

Step 1: Insert the Redhat Enterprise Linux 5 DVD and Power on the system; you will see the first installation screen with a boot prompt, press “ENTER” to begin installation (see *Figure C-1 on page C-2*).

C.2.2 Step 2.



Figure C-2. Skip Key

Step 2: Press the “tab” key to move focus to the “Skip” key, then press the “Enter” key to continue to the Welcome screen. (See *Figure C-2 on page C-2*).

C.2.3 Step 3



Figure C-3. Welcome Screen

Step 3: Press Enter and you will see the **Welcome** screen. The Welcome screen does not prompt you for any input. From this screen you can access the Release Notes for Red Hat Enterprise Linux 5.0.0 by clicking on the Release Notes button (see *Figure C-3 on page C-3.*) Click the **Next** button to continue.

C.2.4 Step 4



Figure C-4. Language Selection

Step 4: Using your mouse, select a language to use for the installation. The language you select here will become the default language for the operating system once it is installed. Selecting the appropriate language also helps target your time zone configuration later in the installation. The installation program tries to define the appropriate time zone based on what you specify on this screen. Once you have made the language selection, click **Next** to continue. (see *Figure C-4 on page C-3.*)

C.2.5 Step 5



Figure C-5. Selecting Layout Type

Step 5: Using your mouse, select the correct layout type (for example, U.S. English) for the keyboard you would prefer to use for the installation and as the system default. Once you have made the selection, click **Next** to continue. (see *Figure C-5 on page C-4*).

C.2.6 Step 6



Figure C-6. Enter Installation Number

Step 6: Enter the installation number, if you don't have an installation number; select the Skip Entering Installation Number Radio Button. Click OK, and if you did not enter an installation number, you'll be given a warning. Click Skip to continue, otherwise click Next to continue.(see *Figure C-6 on page C-4*).

C.2.7 Step 7



Figure C-7. Partitioning

Step 7: Partitioning allows you to divide your storage drive into isolated sections, where each section behaves as its own storage drive. Partitioning is particularly useful if you run multiple operating systems.

On this screen you can choose to create the default layout or choose to manually partition using the 'Create custom layout' option of **Disk Druid**.

The first three options allow you to perform an automated installation without having to partition your drive(s) yourself. If you do not feel comfortable with partitioning your system, it is recommended that you *do not* choose to create a custom layout and instead let the installation program partition for you.

You can configure an iSCSI target for installation, or disable a dmraid device from this screen by clicking on the 'Advanced storage configuration' button (see *Figure C-7 on page C-5*). Click **Next** to continue.

C.2.8 Step 8

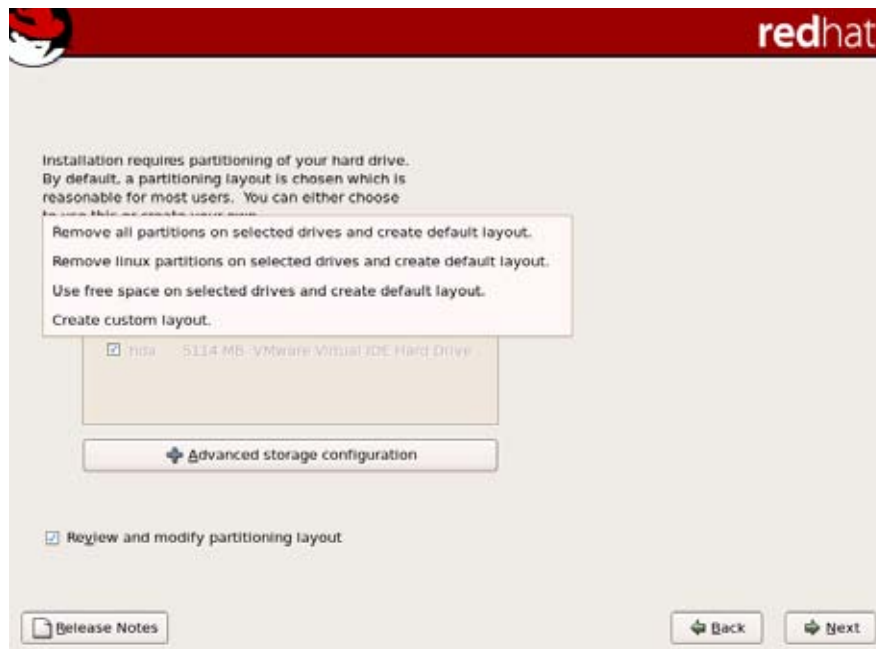


Figure C-8. Reviewing Option

Step 8: Create default layout allows you to have some control concerning what data is removed (if any) from your system. Your options are:

- **Remove all partitions on selected drives and create default layout** — select this option to remove all partitions on your storage drive(s) (this includes partitions created by other operating systems such as Windows VFAT or NTFS partitions).
- **Remove Linux partitions on selected drives and create default layout** — select this option to remove only Linux partitions (partitions created from a previous Linux installation).
This does not remove other partitions you may have on your storage drive(s) (such as VFAT or FAT32 partitions).
- **Use free space on selected drives and create default layout** — select this option to retain your current data and partitions, assuming you have enough free space available on your storage drive(s).

Using your mouse, choose the storage drive(s) on which you want Red Hat Enter-

prise Linux to be installed. If you have two or more drives, you can choose which drive(s) should contain this installation. Unselected drives, and any data on them, are not touched.

To review and make any necessary changes to the partitions created by automatic partitioning, select the **Review** option. After selecting **Review** and clicking **Next** to move forward, the partitions created for you appear in **Disk Druid**. You can make modifications to these partitions if they do not meet your needs (see *Figure C-8 on page C-6*). Click **Next** once you have made your selections to proceed.

C.2.9 Step 9



Figure C-9. Creating a Custom Layout

Step 9: If you chose one of the automatic partitioning options and selected **Review**, you can either accept the current partition settings (click **Next**), or modify the setup using **Disk Druid**, the manual partitioning tool.

If you chose to create a custom layout, you must tell the installation program where to install Red Hat Enterprise Linux. This is done by defining mount points for one or more drive partitions in which Red Hat Enterprise Linux is installed. You may also need to create and/or delete partitions at this time (see *Figure C-9 on page C-7*).

Click **Next**.

C.2.10 Step 10



Figure C-10. Setting Up Boot Loader

Step 10: Once you have configured your partitions, set up a boot loader. If you select “No Boot Loader will be Installed,” you’ll need to use a third-party boot loader such as Partition Magic or Microsoft’s TLDR. If you want to set up a Boot Loader Password, or to configure more advanced boot loader options, select the appropriate check box. (see *Figure C-10 on page C-8*).

To configure more advanced boot loader options, such as changing the drive order or passing options to the kernel, be sure **Configure advanced boot loader options** is selected before clicking **Next**.

C.2.11 Step 11



Figure C-11. Master Boot Record (MBR)

Step 11: Now that you have chosen which boot loader to install, you can also determine where you want the boot loader to be installed. You may install the boot loader in one of two places:

- **The master boot record (MBR)** — This is the recommended place to install a boot loader, unless the MBR already starts another operating system loader, such as System Commander.

The MBR is a special area on your storage drive that is automatically loaded by your computer's BIOS, and is the earliest point at which the boot loader can take control of the boot process. If you install it in the MBR, when your machine boots, GRUB presents a boot prompt. You can then boot Red Hat Enterprise Linux or any other operating system that you have configured the boot loader to boot (see *Figure C-11 on page C-9*).

- **The first sector of your boot partition** — This is recommended if you are already using another boot loader on your system. In this case, your other boot loader takes control first. You can then configure that boot loader to start GRUB, which then boots Red Hat Enterprise Linux. If your system only uses Red Hat Enterprise Linux, you should choose the MBR.

Click the **Change Drive Order** button if you would like to rearrange the drive order or if your BIOS does not return the correct drive order. Changing the drive order may be useful if you have multiple SCSI adapters, or both SCSI and IDE adapters, and you want to boot from the SCSI device. Click **Next**.

C.2.12 Step 12



The screenshot shows the 'Network Devices' configuration window in the Red Hat Enterprise Linux 5 installer. The window has a red header with the text 'RED HAT ENTERPRISE LINUX 5'. Below the header, there is a section titled 'Network Devices' containing a table with columns 'Active on Boot', 'Device', 'IPv4/Netmask', and 'IPv6/Prefix'. The first row shows 'eth0' with 'DHCP' for both IPv4 and IPv6. To the right of the table is an 'Edit' button. Below the table is a 'Hostname' section with the text 'Set the hostname:' and two radio buttons: 'automatically via DHCP' (unselected) and 'manually' (selected). The 'manually' option has a text input field containing 'rhel5.localdomain' and a hint '(e.g., host.domain.com)'. Below the hostname section is a 'Miscellaneous Settings' section with three text input fields for 'Gateway', 'Primary DNS', and 'Secondary DNS'. At the bottom left is a 'Release Notes' button, and at the bottom right are 'Back' and 'Next' buttons.

Active on Boot	Device	IPv4/Netmask	IPv6/Prefix
<input checked="" type="checkbox"/>	eth0	DHCP	DHCP

Hostname
Set the hostname:
☐ automatically via DHCP
☒ manually (e.g., host.domain.com)

Miscellaneous Settings
Gateway:
Primary DNS:
Secondary DNS:

Figure C-12. Network Devices List

Step 12: The installation program automatically detects any network devices you have and displays them in the **Network Devices** list (see *Figure C-12* on page C-10). Once you have selected a network device, click **Edit**.

C.2.13 Step 13

Edit Interface eth0

Configure eth0 - Advanced Micro Devices [AMD] 79c970 [PCnet32 LANCE]

Hardware address: 00:0C:29:42:45:96

☒ Use dynamic IP configuration (DHCP)

☒ Enable IPv4 support

☒ Enable IPv6 support

☒ Activate on boot

	Address	Prefix (Netmask)
IPv4:	<input type="text"/>	<input type="text"/>
IPv6:	<input type="text"/>	<input type="text"/>

Figure C-13. Edit Interface Pop-Up Screen

Step 13: From the **Edit Interface** pop-up screen, you can choose to configure the IP address and Netmask (for IPv4 - Prefix for IPv6) of the device via DHCP (or manually if DHCP is not selected) and you can choose to activate the device at boot time. If you select **Activate on boot**, your network interface is started when you boot (see *Figure C-13 on page C-11*). If you do not have DHCP client access or you are unsure what to provide here, please contact your network administrator. Click **OK**.

C.2.14 Step 14



Figure C-14. Selecting Time Zone

Step 14: Set your time zone by selecting the city closest to your computer's physical location. Click on the map to zoom in to a particular geographical region of the world (see *Figure C-14 on page C-12*).

From here there are two ways for you to select your time zone:

- Using your mouse, click on the interactive map to select a specific city (represented by a yellow dot). A red **X** appears indicating your selection.
- You can also scroll through the list at the bottom of the screen to select your time zone. Using your mouse, click on a location to highlight your selection.

Click **Next**.

C.2.15 Step 15



Figure C-15. Setting Up Root Account and Password

Step 15: Setting up a root account and password is one of the most important steps during your installation.

Your root account is similar to the administrator account used on Windows NT machines. The root account is used to install packages, upgrade RPMs, and perform most system maintenance.

Logging in as root gives you complete control over your system (see *Figure C-15 on page C-13*).

Click **Next**.

C.2.16 Step 16



Figure C-16. Package Installation Default Screen

Step 16: Now that you have made most of the choices for your installation, you are ready to confirm the default package selection or customize packages for your system.

The **Package Installation Defaults** screen appears and details the default package set for your Red Hat Enterprise Linux installation. This screen varies depending on the version of Red Hat Enterprise Linux you are installing (see *Figure C-16 on page C-14*).

To customize your package set further, select the **Customize now** option on the screen. Clicking **Next** takes you to the **Package Group Selection** screen.

C.2.17 Step 17



Figure C-17. Optional Packages

Step 17: You can select package groups, which group components together according to function (for example, **X Window System** and **Editors**), individual packages, or a combination of the two. To select a component, click on the checkbox beside it. Select each component you wish to install.

Once a package group has been selected, if optional components are available you can click on **Optional packages** to view which packages are installed by default, and to add or remove optional packages from that group (see *Figure C-17 on page C-15*). If there are no optional components this button will be disabled. Click **Next**.

C.2.18 Step 18



Figure C-18. Option to Review or Continue

Step 18: Once you have selected the package groups of your choice, you get one last chance to go back before starting the installation process. Click Next if you're happy with your choices, or click Back to make changes (see *Figure C-18 on page C-16*). Click **Next**.

C.2.19 Step 19



Figure C-19. Installation Begins

Step 19: Installation Starts (see *Figure C-19 on page C-16*).

C.2.20 Step 20

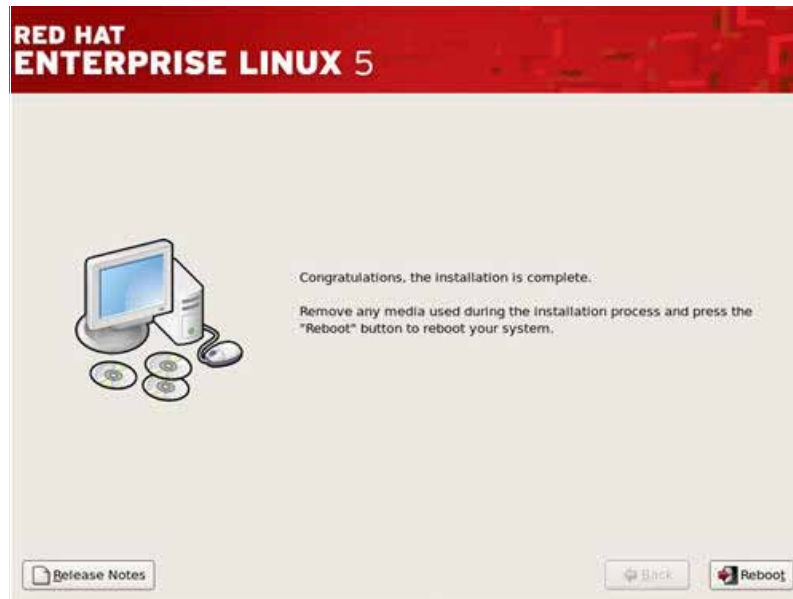


Figure C-20. Installation is Complete

Step 20: Congratulations! Your Red Hat Enterprise Linux installation is now complete! The installation program prompts you to prepare your system for reboot. Remember to remove any installation media if it is not ejected automatically upon reboot (see *Figure C-20 on page C-17*)

After your computer's normal power-up sequence has completed, the graphical boot loader prompt appears at which you can do any of the following things:

- Press Enter — causes the default boot entry to be booted.
- Select a boot label, followed by Enter — causes the boot loader to boot the operating system corresponding to the boot label.
- Do nothing — after the boot loader's time-out period, (by default, five seconds) the boot loader automatically boots the default boot entry.

Do whatever is appropriate to boot Red Hat Enterprise Linux. One or more screens of messages should scroll by.

C.2.21 .Step 21



Figure C-21. Login Screen

Step 21: Eventually, a `login:` prompt or a GUI login screen appears (if you installed the X Window System and chose to start X automatically). (see *Figure C-21 on page C-18*).

C.2.22 Step 22



Figure C-22. Ready to use the Desktop

Step 22: Once logged in, you are ready to use the desktop (see *Figure C-22 on page C-18*).

Appendix D

Optional Remote On/Off Switch

D.1 Remote On/Off Configuration

Customers interested in installing an *optional* switch from which to remotely turn the RES-32XR3/FIO **on** or **off** are able to order a Remote On/Off Switch module that is easily installed in an available storage-drive bay (see *Figure D-1*, which shows the Remote On/Off Switch installed in an RES-32XR3/FIO system).



Figure D-1. Remote On/Off Switch Module

The Remote On/Off Switch module is installed after first removing one of the existing RES-32XR3/FIO storage drives (any except the boot drive), then installing a cable with a standard male DB9 connector at one end and an On/Off switch (an LED is *optional*) at the other end.

When operational, if the RES-32XR3/FIO is turned **OFF**, pressing the remote switch ON will turn the system on.

If the RES-32XR3/FIO is turned **ON**, pressing the switch OFF for less than 4 seconds will gracefully shut down the system through the BIOS; pressing the switch OFF for 4 seconds or more results in a “hard” power off (equivalent to pulling the plug” on the system).

D.2 Remote Only Configuration

When the Remote On/Off Switch module is configured as an ON-only device, if the RES-32XR3/FIO is turned **OFF**, pressing the remote switch ON will turn the system on. Turning the RES system off, however, requires pressing the ON/OFF button that is located directly on the front of the RES-32XR3/FIO chassis.

D.3 Ordering the Remote On/Off Switch

Because internal modifications must be made to the RES-32XR3/FIO in order to support the Remote On/Off Switch module, the module must be ordered and installed at the time your system is ordered.

Appendix E

Re-Packing Instructions

E.1 Re-Packaging for Shipment

If it becomes necessary to return equipment to Themis Computer, it is very important that the equipment be shipped in packaging that provides adequate protection against crushing and moisture invasion. The original packaging is best for this purpose, provided the packaging is retained in serviceable condition. If the original packaging is no longer serviceable, or no longer available, care should be taken in repackaging for shipment so that the equipment is protected from damage in transit. Equipment should be wrapped in a moisture resistant covering and placed either in double boxes, or in boxes with crush resistant insulation between the equipment and the outer walls of the container. If using the original packaging, the clear plastic membrane should be placed next to the equipment, i.e. up against the bottom, or down against the top.

The following instructions assume the original packing components are still available, and in serviceable condition.

E.2 Packing Components

The original packing components are shown in **Figure E-1**. (page E-2). They comprise a packing box, bottom crush-resistant layer, and top crush-resistant layer. The bottom and top crush-resistant layers are identical components, placed so that the side with the plastic membrane is against the equipment.

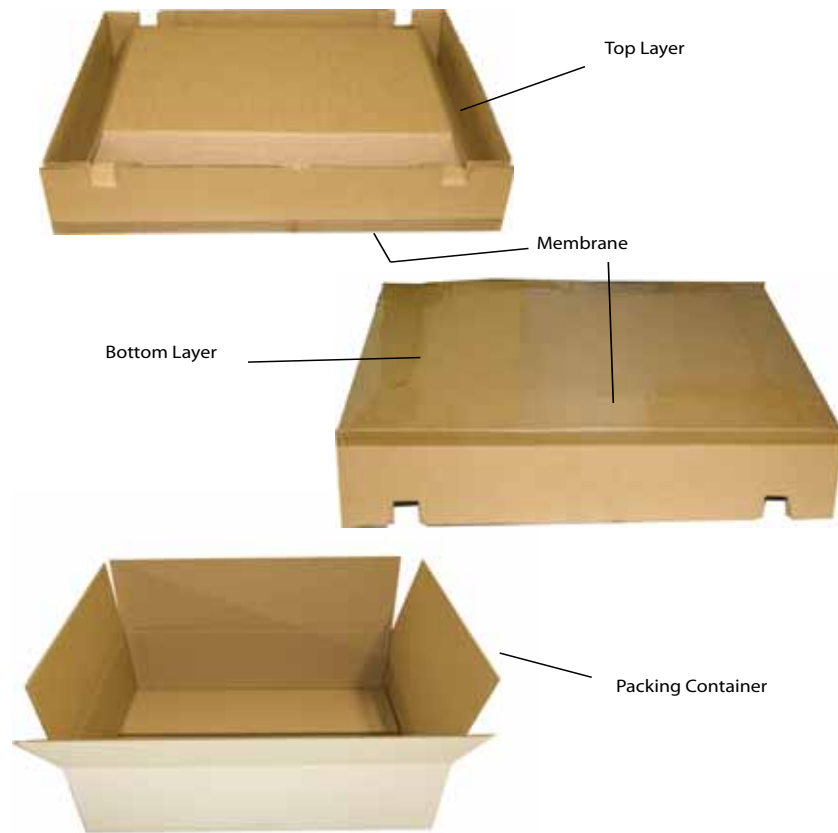


Figure E-1. Packaging Components

E.3 Instructions for Re-Packing

Re-assemble the packing material about the equipment in accordance with the following instructions: (See **Figure E-2.** (page E-3))

- Inspect the original packing materials for serviceability.
- Place one crush-resistant layer open side down, membrane side up, in the bottom of the box.
- Place the equipment on top of the bottom layer, right side up.
- Place the other crush-resistant layer, membrane side down, open side up, on top of the equipment.

- Press down on the top layer to firmly compress the layers around the equipment, and allow for the box flaps to be closed.
- Seal the top of the box with strong packing tape, wrapping the tape completely around the box, both lengthwise, and crosswise.
- Prepare for shipment in accordance with the instructions received from Themis Computer.

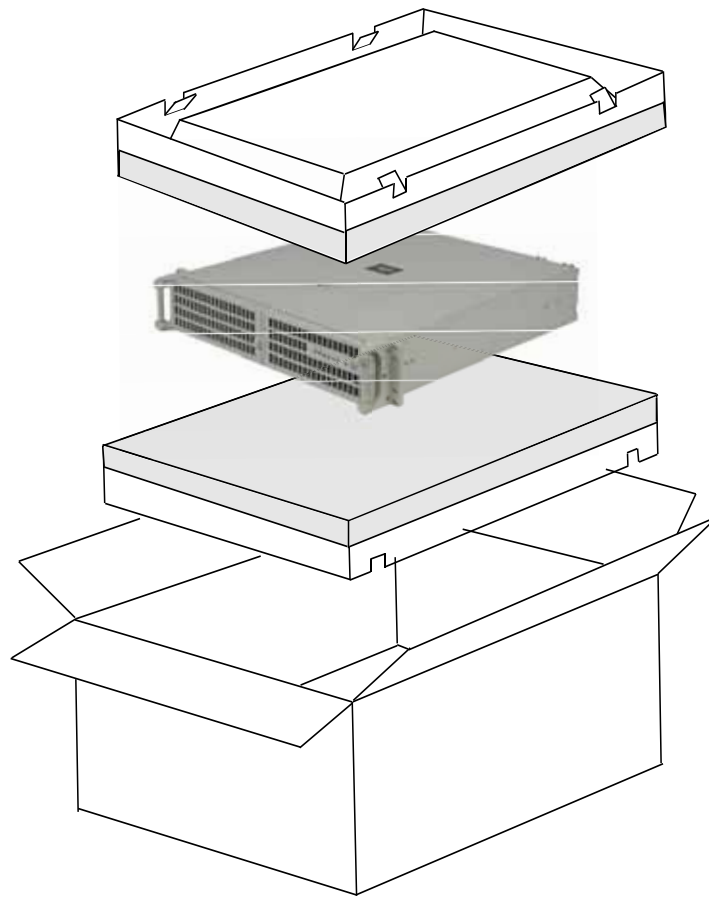


Figure E-2. Order of Assembly

Index

Numerics

120-mm-fan housing 2-1
19" rack *xxii*
3RU form-factor 1-2
5520 chipset 1-10

A

AC

on/off switch 2-16
power cord 1-18, 2-15, 2-16
power LED 2-17
power socket 2-15
power supply 1-4
accessory kit 1-18
antistatic bags 2-1
antistatic wrist strap 2-1
applications
 military/aerospace 1-1
 telecommunications 1-1

C

Cautions *xxiii*
COM1 / COM2 serial port/header 1-9
Comments *xxiii*
components, major 1-4
Configuration, system 2-16
CPU 1-1

D

Dimensions, chassis 1-5

E

Electrical Specifications 1-16
Electrostatic Discharge 1-17
EMI *xxii*
Environmental Specifications 1-17
ESD

grounding techniques 2-1
protected mat 2-1
Ethernet A-4

F

flanges 2-14
form-factor, 3RU 1-2
front panel 1-4
fused AC 1-16

G

General Specifications 1-15
Getting Started 2-16
Gigabit Ethernet A-4

I

I/O Connectors

Ethernet LAN Port 1-9
PS/2 keyboard 1-9
PS/2 mouse 1-9
Serial Ports 1-9
USB Serial Ports 1-9

I/O connectors 1-5

I/O faceplates 1-4

ICH10R + IOH-36D *xxii*

Installation procedures 2-1

installing rack-mount slides B-1
memory modules 2-4
PCI cards 2-7

Instructions for Re-Packing E-2

Intel 5520 (Tylersburg) chipset *xxii*

Intel chipset *xxii*

Intel Xeon CPU *xix*

Intel Xeon CPU, 1366-pin 1-1

K

keys, front bezel 1-18

L

LAN port *A-4*
latch locks *1-4*
LEDs *1-5*
 NIC (Gb Ethernet) *1-8*
 SATA storage drives (SD) *1-8*
 system *1-4*
Linux Installation *2-16*
lithium battery *2-1*
 installation *2-9*
 lithium battery and socket, illustration of *2-8*
 removal *2-8*

M

Main BIOS Setup Screen *3-5*
Major Components of the RES-32XR3/FIO
 (Open Top View) *1-6*
Major Features Table *1-2*
 Chipset *1-2*
 Expansion Slots *1-2*
 Front I/O *1-2*
 Memory *1-2*
 Processors *1-2*
 Storage Drive Options *1-2*

N

Notes *xxiii*

O

Operating temperature *1-5*
Optional Remote On/Off Switch *D-1*
Output Voltage *1-17*
Overheat LED *1-8*

P

Packaging and Shipping *1-18*
Packing Components *E-1*
PCI cards *2-1, 2-7*
pinouts
 Gigabit Ethernet LAN *A-4*
 serial ports *A-2*

USB port *A-2*

Plugging in and Securing the AC Power
 Cords *2-15*

power

 button *1-4*
 button and LED *2-16*
 cord sockets *1-4*
 LED *2-17*

power cords *2-16*

power supply *1-5, 2-1, 2-16*

 installation *2-13*
 locking mechanism *2-13*

power-cord retainer bracket *1-18*

protective cover, chassis *2-1*

PS/2 keyboard *A-1*

PS/2 mouse *A-1*

R

rack-mount brackets *2-14*

 with handles *2-14*

 without handles *2-14*

rack-mount slides *xxii, 1-19, B-1*

 installation kit *B-2*

 screw locations *B-1*

rack-mount slides (optional) *2-15*

Red Hat Enterprise Linux *C-1*

Re-Packaging for Shipment *E-1*

Re-Packing Instructions *E-1*

RES-32XR3/FIO *1-1*

reset switch *1-4*

RES-x2XR3 Manual Matrix (AC and DC Power
 Supplies) *xx, xxi, xxii*

S

Safety Instructions *iv*

 Electrostatic Discharge (ESD) *v*

 Instructions for the Lithium Battery *vi*

 Operation of Laser Source Devices *v*

screw locations for rack-mount slides *B-1*

serial ports *A-2*

Shock *1-17*

shock *xxii*

Shock endurance *1-5*
Sidebars *xxiii*
slides, rack-mount *xxii*
Specifications
 Altitude *1-15*
 BTU Rating *1-16*
 Dimensions *1-15*
 Electrostatic Discharge *1-17*
 Input Current *1-16*
 Input Frequency *1-16*
 Input Leakage *1-16*
 Input Power *1-16*
 Input VA Rating *1-16*
 Input Voltage *1-16*
 Maximum Wet Bulb *1-15*
 Packaging and Shipping *1-18*
 Plug Type *1-16*
 Power Factor *1-16*
 Relative Humidity *1-15*
 Shock *1-17*
 Temperature *1-15*
 Weight *1-15*
storage drives *2-1*
 installation *2-10*
 removal *2-9*
Super I/O *1-14*
system LEDs *1-5*
 NIC (Gb Ethernet) *1-8*
 Overheat *1-8*
 Power *1-8*
 Power Fail LED *1-8*
 SATA storage drives SD) *1-8*
System Power *1-16*

T

Technical Support *1-18*
temperature *xxii*
TTYA (COM1) *A-2*
Turning the System Off *2-17*
Turning the System On *2-16*

U

USB ports *A-2*
USB Serial Ports *1-9*

V

VGA connector *2-16*
VGA Connector-Pin Signals *A-3*
VGA graphics port *A-3*

W

Warnings *xxiii*
Website Information *xxiii*

X

Xeon processors *1-1*

Place
Stamp
Here

Themis Computer
47200 Bayside Parkway
Fremont, CA 94538
Attn: Publications Department

Fold here; tape at top to seal



Reader Comment Card

We welcome your comments and suggestions to help improve the *RES-32XR3 Installation Manual*—FIO. Please take time to let us know what you think about this manual.

- Information provided in the manual was complete.
Agree____ Disagree____ Not Applicable____
- Information was well documented and easy to follow.
Agree____ Disagree____ Not Applicable____
- Information was easily accessible.
Agree____ Disagree____ Not Applicable____
- The manual was useful.
Agree____ Disagree____ Not Applicable____
- Please write down any comments you may have about this manual, including how it can be improved:

Name: _____

Title: _____

Company: _____

Address: _____